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SWIMMING

PRENTICE-HALL BOOKS ON HEALTH AND SPORTS

EDITED BY ELMER D. MITCHELL

SWIMMING

FUNDAMENTALS

by

MATT MANN II

Coach of the University of Michigan Swimming Team, Former Member of the Olympic Swimming Committee of the United States

and

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New York

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Foreword

I APPRECIATE the honor of being asked to write a foreword to this new book on *Swimming*. Matt Mann and I have been in friendly association for many years and have had a mutual interest in this sport. It is a pleasure to have him at last put down in writing his ideas on swimming.

The book reflects the personality of a master coach as interpreted by the collaborator, Professor Fries, who can boast of a swimming family: Himself a finished swimmer, he has three sons: Chucky, age 16, who won swimming laurels in Germany last year, Robby, who started swimming at 18 months, and Peter, the youngest, who was swimming when only 8 months old.

There is a distinct mark of originality in this book. It represents one man's pattern, tried and proven through successful teaching of thousands of beginners. The book is simple, direct, and omits all non-essentials. The authors go directly to their job, which is that of teaching the fundamentals. The illustrations are from actual situations and bring out clearly the essential body movements in the swimming strokes that are explained.

Swimming is one sport about which many books have been written, but there is a definite place for this modern and timely book by Coach Mann and Dr. Fries. It represents a contribution to the literature on swimming.

EDWARD T. KENNEDY
Coach of Swimming, Columbia University.
Editor, National Collegiate Athletic Association Swimming Guide, 1932-1939.

Matt Mann—Teacher and Coach

EVER SINCE Matt Mann first took a team to the National Collegiate Swimming Championships in 1927, his teams from the University of Michigan have consistently been winners. His team had the highest score in the following years: 1939, 1938, 1937, 1936, 1935, 1934, 1932, 1931, 1928, 1927. In each of the three years in which his team did not have the highest score it had the second-highest score—1929, 1930, 1933. During this same period Matt Mann's team also won ten of the annual Swimming Championships of the Big Ten Universities of the Middle West. As one reads the record of the swimming championships he finds an ever-increasing number of the names of men who have been taught by Matt Mann. And coaches and teachers throughout the country have wanted to know the secret of his magic.

That secret is not a single matter: it is a complex of many factors, but all of them understandable in themselves.

Matt Mann's whole life has been identified with swimming. He began appearing as a contestant in swimming matches when he was only eight years of age. At nine he won the boys' championship of England. From nine until he was seventeen he swam for the Leeds Swimming Club. After that, in London, he swam for the Ravensbourne Club and was on that team when they won the City of London Championship in 1903-04. He not only *has been,* but, at fifty, he still *is* a swimmer. He uses all the strokes and himself tries out the new ideas that are

constantly being proposed for the increasing of speed and efficiency. Adventurous in spirit, strongly believing in the possibility of continued improvement, he welcomes every new suggestion and experiments with all those that seem in any way promising.

Matt Mann has great genius as a teacher. He has an uncanny ability in analyzing the practice of his pupils (whether they be beginners or varsity stars) and in putting his finger on the exact point that needs attention. He seems to feel very sensitively every motion of the swimmer and not only to see the result against a pattern of an ideal stroke but to sense in detail the relation of each motion to some feature of the stroke. As a result there is nothing rigid about his teaching. He is always flexible and *patterns the stroke to the individual, not the individual to the stroke.* And that is the chief reason he has never before been willing to put his teaching in a book. It has seemed impossible, certainly extremely difficult, to keep that teaching flexible and adaptable to differing individuals when put into cold print, and no rigid dogma could possibly contain Matt Mann's actual teaching.

More especially the secret of Matt Mann's magic lies in the character of the man himself. He is fundamentally an athlete always in training. He never touches alcohol and never smokes. He is wholehearted, vigorous, absolutely out and out, and therefore not always tactful. He inspires in his boys a passion for doing their best. And when his boys give their best they usually win, for they are inspired by the faith that makes champions. *Possunt quia se posse videntur*—"They are able, because they think themselves to be able." Underneath everything, there is in Matt Mann a primary faith, for he is a deeply religious man and his fundamental faith, although it is never pushed forward, is a part of all he does.

These three important characteristics of Matt Mann's per-

sonality must be kept in mind as one follows the course of his career.

Matt Mann was born in Yorkshire, England, in 1884. At 21 he emigrated to Canada and a year later came to the United States. In Buffalo, while yet an amateur, he held the National Y.M.C.A. records for the 100- and 220-yard distances. Here he began his teaching and coaching career. The Central High School team and the Lafayette High School team, which he coached, won the first and second places of the Western New York High School Swimming Championship. Among the swimmers of the Central High School team was the first pupil he had taught to swim when he turned professional, Paul Roberts, who became captain of the Yale swimming team in 1914 and National Intercollegiate Champion for both the 50- and the 100-yard distances.

After three years at Buffalo, Matt Mann went to the University of Syracuse to take charge of the new pool opened there in 1909. At this time much controversy raged over the crawl stroke. Everyone insisted that although it was much faster than other strokes it was a very hard stroke to do. Beginners were taught the breast stroke first, then the side stroke and the trudgeon stroke in that order; and finally the better swimmers were introduced to the crawl stroke. Matt Mann showed here his independence and pioneering spirit by *starting* his beginners with the crawl stroke, and continued to do so in spite of the storm of criticism this new procedure raised. He believed that the crawl stroke was simply a slightly elaborated and regularized dog-paddle and therefore a fundamentally natural stroke for man as well as animals. As a matter of fact, he demonstrated that part of the difficulty of learning this stroke came from the very fact that the other less natural strokes were learned first and habits were established that interfered with the proper execution of the crawl.

In 1910 he was appointed swimming instructor at the Brook-

line (Massachusetts) Municipal Pool, the first city-owned and operated pool built in the United States. During his five years there, he made the swimming beginners of the Brookline Gymnasium Athletic Association into A.A.U. champions. His 200-yard relay team (R. Hitchcock, Al Handy, R. Pendergast, R. Dean) broke the world's record for this event. Among the champions developed at Brookline were Russell Dean, co-holder of the world's back-stroke record; Leo Handy, holder of free-style records for all distances from 100 yards to a mile; Roger Bird and Arthur Wales, interscholastic and national plunging champions; and Frank Journette, national scholastic diving champion.

Not less important than the champions developed was the fact that during the years 1912, 1913, and 1914 *every* school child of Brookline from the fourth to the eighth grade (except those who had physicians' certificates forbidding them to go into the water) could swim. The Brookline High School swimming team became one of the best in the country and won the national interscholastic title at Princeton for two years.

During part of this period, in addition to his duties at Brookline, Matt Mann coached the Harvard University swimming team and during parts of the months of December and January coached the swimming team of the United States Naval Academy at Annapolis.

In 1916 he went to the New York Athletic Club, where he coached such men as Al Downs, Joe Dunne, Arthur McAluman, all three national A.A.U. diving champions, and Al Volmer and Bud Goodwin, national swimming champions. Goodwin was a member of the United States Olympic team three times. Besides his work with the New York Athletic Club, Matt Mann, at the same time, not only taught the swimming teams of the Lawrenceville School, the Polytechnical School of Brooklyn, and the Berkeley Irving School of New

York City, but he also spent three nights a week at New Haven coaching the Yale swimming team. During the years of his work there the Yale team never lost a dual meet. The Yale relay teams, particularly the 200-yard team, made the world's record each year that he was there.

He next went to the Duluth Boat Club to take charge of its new pool. When he arrived in Duluth he did not find one man that could swim the crawl stroke. But during the two years he was there his young boys—all of whom he had taught to swim—won the Minnesota state championship, breaking every record that Minnesota had at that time. Among these boys were Leonard Draper, state champion for the mile and later captain of the Princeton University swimming team; Jack Gow, an All-American sprinter who became captain of the University of Michigan swimming team; Mel Cooley, also a mile champion, and Dick Bennett, two of the best swimmers that the University of Minnesota has had; and Van Mattemore, better known as Richard Arlen, the movie star.

In the fall of 1919 Matt Mann went to the Detroit Athletic Club, and his six years there brought similar successes. There Teddy Cann, whom he had taught as a boy in New York, first brought the world's record for 220 yards under 2 minutes and 20 seconds. There he developed Margaret Woodbridge and Vonny Malcolmson, both of whom were on the Olympic team for 1920. There he organized the renowned club, now twenty years old, called the Beavers, made up originally of the ten best men swimmers of the Detroit Athletic Club who won the long-distance swimming championship of the clubs in the United States. While in Detroit, too, he founded his boys' camp, Camp Chikopi, in Ontario, Canada, a camp made famous by the hundreds of boys who have been taught to swim there and those developed into champions. Some eighteen All-American swimmers were taught to swim at this camp.

In 1925 Matt Mann started the work at the University of Michigan that has made its swimming team the National Collegiate Champions ten times in thirteen years. Some of the champions he developed at the University of Michigan are: Paul Samson, captain in 1928 and member of the 1928 Olympic team; Garnet Ault, captain in 1929 and member of the 1928 Olympic team of Canada; James Cristy, a beginner developed at Camp Chikopi, captain in 1931 and member of both the 1932 and 1936 Olympic teams; Dick Degener, member of both the 1932 and 1936 Olympic teams and Olympic diving champion in 1936; Jack Kasley, a product of Camp Chikopi, captain in 1936, world record holder of the breast stroke for the 100-yard, the 100-meter, the 200-yard, the 200-meter, and the 220-yard distances; and Taylor Drysdale, co-captain in 1937 and member of the 1936 Olympic team. The relay team composed of Ed Kirar, Bob Mowerson, Waldemar Tomski, and Tom Haynie in 1936 broke the world record for the 400-yard distance with an average of 52.6 seconds for each 100 yards. Tom Haynie, captain in 1939, now holds the world record for the 150-yard medley swim. The University of Michigan, with swimming teams developed by Matt Mann, has had more men on the Olympic swimming teams than any other single college or university.

Former pupils of Matt Mann who have become college swimming coaches themselves are Frank P. Wall at New York University, Charles McCaffree at Iowa State, Dick Papenguth at Purdue, Tex Robinson at the University of Texas, Ben Grady at the University of Pittsburgh, and Ed Slezak, coach at Notre Dame.

It is but natural that those who have seen the results of Matt Mann's teaching and coaching should want to have his views of swimming and his methods of teaching recorded for the benefit of men and women everywhere who are intensely interested in

swimming efficiently. The chapters of this book attempt to capture and analyze and explain as much of those views and as much of those teaching methods as can be set forth by picture and discussion.

CHARLES C. FRIES

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III. The "Fish Tail"

SWIMMING

1

The Key to Modern Swimming—Relaxation

MODERN SWIMMING has been characterized by a remarkable reduction in swimming times and a lowering of records especially for the middle and the long distances. The following tables show the times in which the various championship races were won in the years indicated.

TABLE I

WESTERN CONFERENCE SWIMMING CHAMPIONSHIPS

Year	*Free Style 100 yards*	*Free Style 220 yards*	*Free Style 440 yards*	*Breast 200 yards*
1911	66.8		6:59	
1912	67.6	3:00.8	6:00	
1913	60.	2:48	6:06.8	
1915	59.2	2:40.6	6:18.6	2:46
1916	59.2	2:33.8	5:47.8	2:51.8
1920	58.4	2:38	6:17.6	2:51.6
1925	53.8	2:24.4	5:16	2:39.8
1930	54.6	2:19	5:07.8	2:35.6
1935	52.9	2:18.2	4:58.6	2:28.8
1939	52.8	2:14.4	4:53.3	2:25.5

TABLE II

NATIONAL COLLEGIATE SWIMMING CHAMPIONSHIPS

Year	*Crawl 100 yards*	*Crawl 220 yards*	*Crawl 440 yards*	*Breast 200 yards*
1925	55	2:23.7	5:24.5	2:40.6
1930	55	2:16.6	4:55.6	2:36.6
1935	52.9	2:11.5	4:42.5	2:28.7
1939	52.9	2:11.7	4:49.7	2:22

TABLE III

RECORDS, FREE STYLE

	100 yards	*220*	*440*
Intercollegiate records	51.6	2:09.6	4:42.5
World records	51.	2:07.9	4:40.8

In 1912, for example, in the Western Conference Swimming Championships, the winner's time in the 100-yard free-style event was 67.6 seconds; in the 220-yard distance it was 3 minutes and 8/10 of a second; in the quarter mile it was 6 minutes flat. In recent years, however, all these times, which were made by college men in their best years, have been surpassed by children less than fourteen years of age. It was the older belief that only "strong" men could swim the longer distances—the quarter mile, the half mile, the mile. Recently, in our own pool, we have had a boy, four-and-a-half years old, who swam a half mile (36 lengths) upon three separate occasions, and once a little over three quarters of a mile (54 lengths). At the end of each of these swims he showed no fatigue and for some ten minutes more continued his swimming in play and racing with his father. It is not now unusual for children of eight or nine years to swim a mile. When the crawl stroke was first introduced, it was thought to be "too

hard" a stroke to be used for a hundred yards. Racers frequently used it for the first 25 yards, then used the trudgeon stroke for two lengths, and again the crawl stroke for the last 25 yards. Now, children of ten or eleven use the crawl stroke without change for a mile. In similar fashion, the newest stroke, the "butterfly" breast stroke, was thought to be good only for short distances when it was first introduced in 1934. But in 1936, when Jack Kasley established his world's records for the breast stroke, he used the "butterfly" without change for the whole 220 yards, and now little Patty Aspinall, twelve years old, has gone a mile using the "butterfly" all the way.

The explanation for all of these developments lies in the word *relaxation*. Relaxation is the key to modern swimming. Relaxation as applied to muscles means for us muscular limpness—having the muscles not tense, not contracted. "Tied up" is the swimmer's term for lack of relaxation. It is to make their muscles as limp as possible that swimmers standing on the starting blocks just before a race will loosely shake their arms and their legs. They want to avoid being tied up, for when they are tied up they cannot swim fast.

Even today, when we should know better, newspapers often account for drownings with the statement that "the swimmer became exhausted." In practically all such cases what actually happens is that the swimmer first becomes "tied up" and then panicky. The feeling of panic or hysteria is both the result of the tensing of the muscles and the cause of increasing the tenseness so that the body cannot function. This "tying up" affects not only the arm and leg muscles, but those of the back and abdomen as well, and, more important than these, the breathing muscles. All that the swimmer needs to do if he is tired is to turn over on his back, relax thoroughly, and rest. With relaxed muscles the buoyancy of the body is greater and any person can thus stay afloat indefinitely, balanced in a satisfactory position for resting, with very slight movements. The person

who says that he cannot learn to swim because he "just naturally sinks" simply has not reached the stage where he can relax his muscles when he is in the water.

Fundamentally, then, the first necessary condition for swimming is that all muscles be as limp as possible. Of course, if all muscles are completely relaxed or limp all the time there can be no activity at all. Therefore, our object must be to have the least possible tenseness of muscle. In swimming there are, first of all, what might be called the *primary* activities—those that are absolutely essential to the process of swimming. There must, for example, be movements of the arms and legs, and certain muscles must be contracted when these are moved. But even here these muscles may be unnecessarily tense for the purpose. As we shall see later, in the crawl stroke, the arm muscles should be tense *only when pressing the hand down.* At other times the arm should rest limp in or on top of the water. We aim then at the greatest possible economy of neural and muscular energy in the primary activities of swimming.

There are, in addition to these primary activities of swimming, what can be called the *secondary* activities—those that are not essentially a part of the actual swimming process. These activities must be reduced to a minimum and carried on with as little tenseness of muscle as possible. For example, the tense breathing muscles, characteristic of the so-called "fighting" for breath, must be avoided. Breathing should be rather the unconscious process it is while we are ordinarily walking.

Of course, in the early stages of setting up the muscular habits of swimming there will be stiffness, unnecessary tenseness, and unessential movements. As long as one is consciously *placing* the hands and arms in any particular positions he cannot be sufficiently relaxed. But when these movements have developed into habits and unconscious reactions, then there can be more and more relaxation in the sense in which the term is

used here. The movements must become similar to those of the loose stride of an Indian on a long journey.

The so-called Japanese crawl stroke, which was much discussed after the Olympics of 1932, was not a different stroke but primarily a modification of the American crawl that permitted greater relaxation. And the changes that have been going on in swimming during the last six years have been fundamentally based on progress in understanding relaxation, in understanding economies in the expenditure of swimming energy.

This development which makes good swimming depend upon maximum relaxation renders swimming even more than it was the most beneficial all-round sport and means of physical development for the human animal. And this is why you will hear over and over again, in any pool where there is a *good* swimming instructor, phrases like the following:

Take your time! Take your time!
Easy! Easy!
Breathe naturally, don't fight it!
Relax! Always *Relax!*

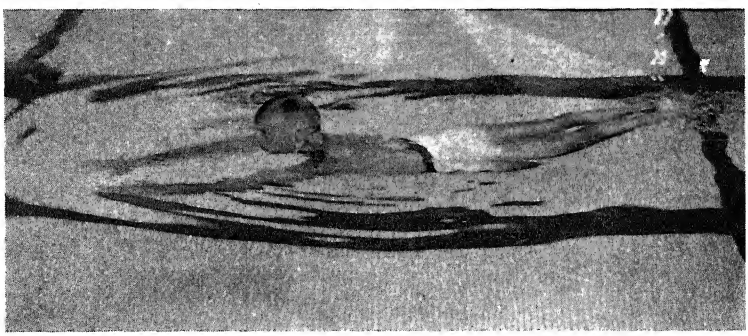
2

The Most Efficient Stroke—The Crawl

THE TEST of efficiency in swimming is speed combined with distance. According to this test there can be no doubt about which stroke must be considered the most efficient, for with the crawl the fastest times have been established for all distances from 40 yards to 5 miles. This crawl stroke, of course, is done with many variations but the fundamental pattern of the stroke is simple and clear. The swimmer lies flat on the water, face down and forward; he uses the arms for pulling, one at a time, alternately; and he kicks with one leg at a time, also alternately. In details there is no absolute right or wrong, but there are fundamental principles. The particular analysis of this stroke given in the following pages is the one that seems to fit the greatest number of swimmers, although it must be emphasized again that in detail the stroke should be fitted to the individual—not the individual to the stroke. The process of the stroke will be set forth in a series of brief statements with accompanying pictures.

The Arm Movements

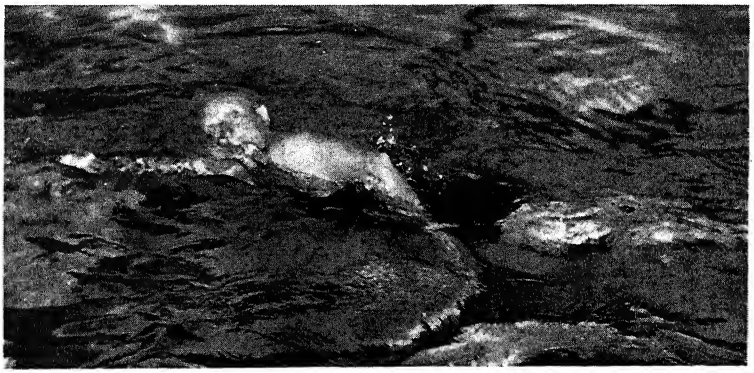
1. The start of the crawl stroke is made from the following position. The person lies flat on the water, face down and forward, chin well out in front, arms extended forward with the hands together palms down, and the legs and feet together with the toes pointed. The whole body should be as thoroughly relaxed as possible.



2. As the left hand is started downward in the pull, the weight of the body seems to ride on the right side and the right hand and arm, that remain extended in front.

3. The left hand, with a slight bend at the wrist toward the body, is pressed straight down. The hand in shallow scoop form must "grip" the water so that the pressure is felt on the finger *tips*. This pressure is continued as the hand goes down, moving through about one-third of a circle.

4. The pressure of the downward movement ceases when the hand has gone through one-third of a circle, and then the left shoulder is lifted slightly.

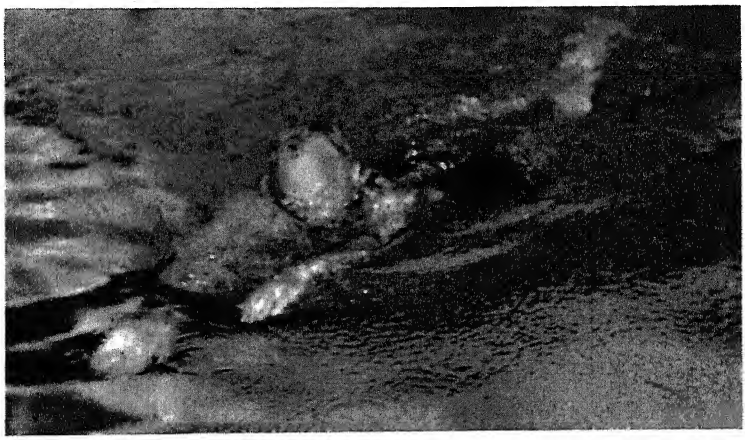


5. The left elbow is lifted out of the water before the hand.

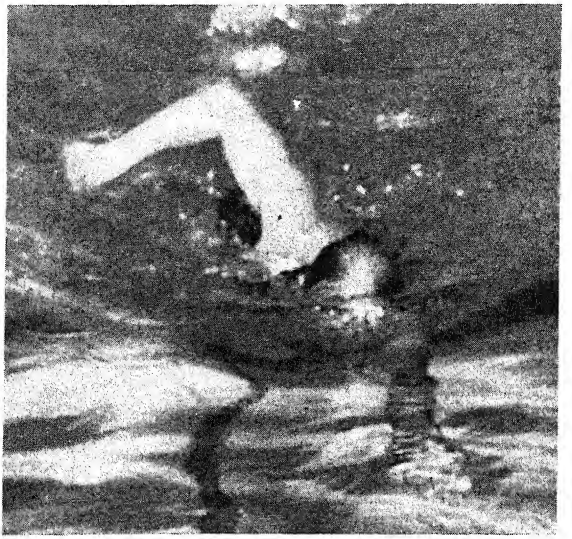
6. The left forearm is thrown forward as the hand comes out of the water. This left arm and hand should be relaxed as much as possible from the moment the pressure is released on the

downward stroke and should now lie, palm down, limp on the surface of the water.

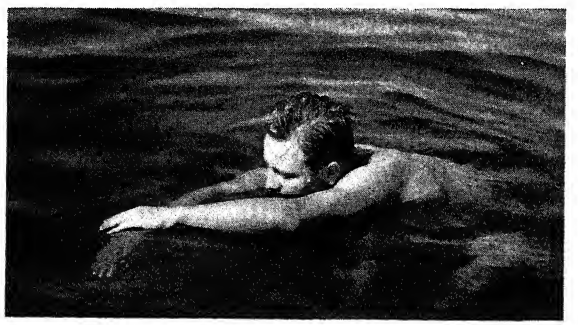
7. During all the movement of the left hand, the right arm and hand lie relaxed on the surface of the water. *After* the left hand has been thrown forward and the body weight has seemed to shift to the left side, the right hand and arm are pressed down through one-third of a circle in movements parallel to those just described above for the left hand and arm.



8. For the right arm and hand also, when the pressure ceases at the "bottom" of the stroke, the shoulder is lifted first, the elbow is raised out of the water, and *then* the hand comes out of the water and is thrown forward.



9. The hand in front, on which the body seems to be riding, does not start down on its stroke until *after* the other hand has been thrown forward, but just *before* it catches the water.



Some Common Faults in the Arm Movements

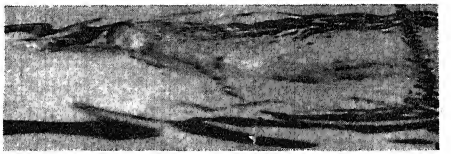
10. The hand does not "grip" the water sufficiently because the wrist is bent upward not downward. The test of the

proper bending of the wrist is the feeling of water pressure upon the finger *tips*.

11. In making the pull the hand often does not go down the full distance, and power is lost because the arm is bent too much at the elbow. The arm should be kept straight except for the slight bend toward the body at the wrist.

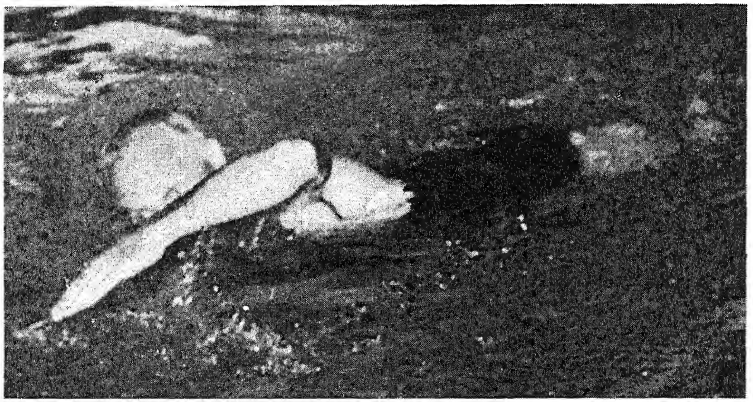
12. Power is lost when the hands are pressed too fast through the water. The hands should "grip" the water, be "anchored" in it, and the body move *through* the water, not the hands. Remember, the hands *slip* when pressed too fast.

13. The arm is frequently pulled back too far. The power of the stroke is in only the first one-third of a circle.

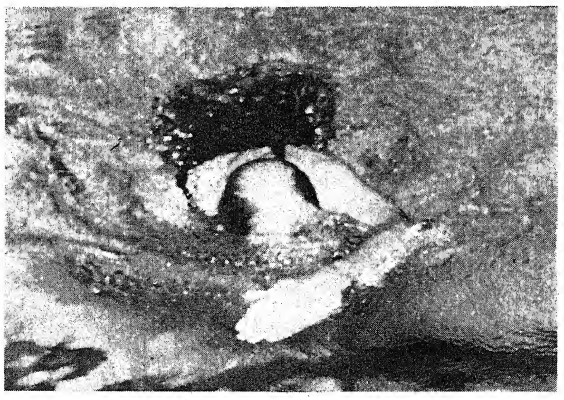


14. The hand is frequently brought out of the water first, causing hindering water pressure against the upper arm. The least loss comes when the shoulder is lifted first and the elbow comes out of the water before the hand.

15. The hands, as they are brought forward, are often put into the water too close to the head and are not then in a satisfactory position to be pressed down in the most effective arc.

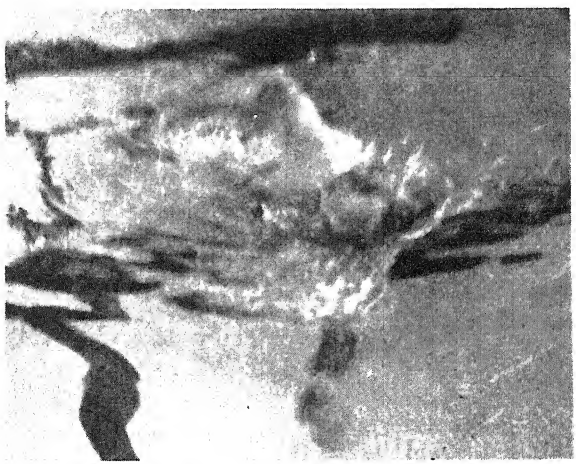


16. The hands, when they are thrown forward, are often brought around too far and, crossing the line of the face, enter the water directly in front of the head instead of straight forward from the shoulder. This "crossing the arms in front" is likely to pull the shoulders around, creating a retarding sway of the body. More important still, it prevents the straight-down full pull with the hands.



17. Often, when the hand is thrown forward, the arm is stretched forward to its maximum length. This "over-reaching," besides preventing satisfactory relaxation, usually pulls the hips from side to side, producing a retarding sway in the rear part of the body.

18. Frequently the hand that is thrust in front, upon which the body should seem to ride during the stroke, starts down too soon, that is, before the other hand has been completely *recovered* and thrust forward. Failure to recover fully before the next stroke is started shows that the body weight is riding on the stroking hand rather than on the extended hand—a method used in an older type of crawl stroke that has been discarded in the interest of greater relaxation.

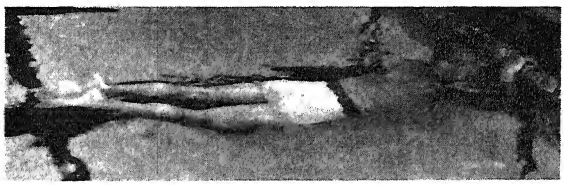


19. Sometimes the shoulder of the stroking arm drops too far into the water. This dropping of the shoulder often accompanies body sway or too much rolling.

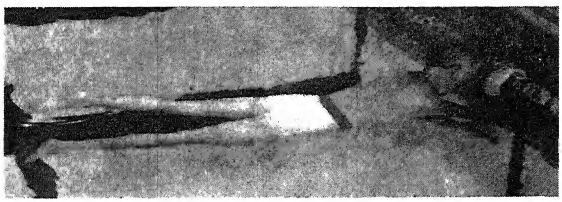
20. Often the head is too low in the water, with the face completely down instead of forward. The chin should be thrust forward; the water line should be on the forehead, and the swimmer should feel himself pressing or "riding" on his chest. He should feel that he is pressing *forward* as well as downward on his chest.

Leg Movements

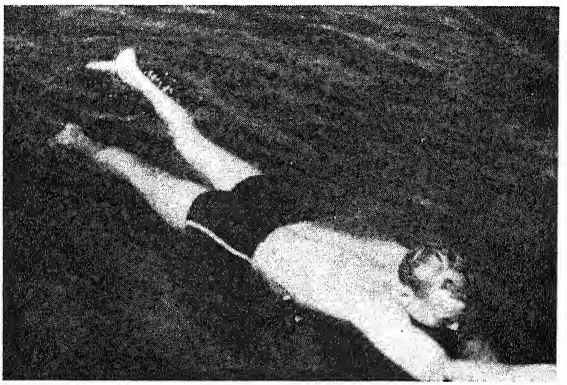
21. The legs are kept nearly straight but relaxed. The toes are pointed in order to present as much as possible of the surface of the foot to the water on the up-kick.



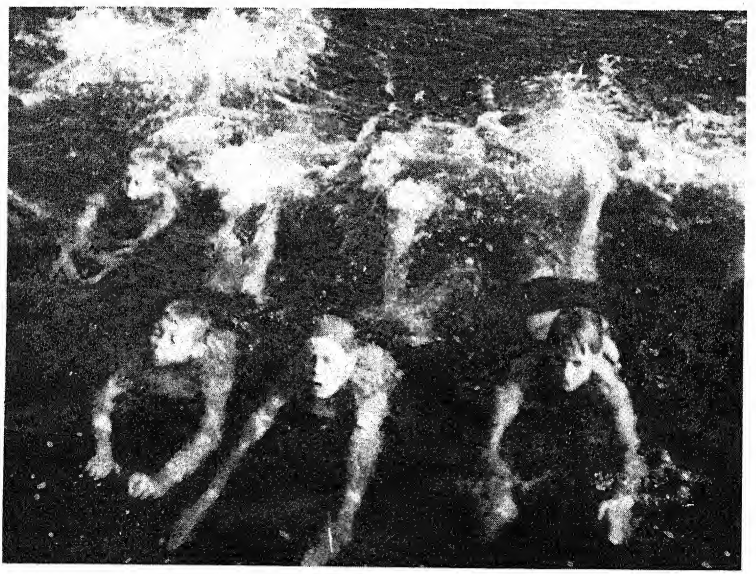
22. As one foot is lifted the other goes down in the water to preserve the body balance.



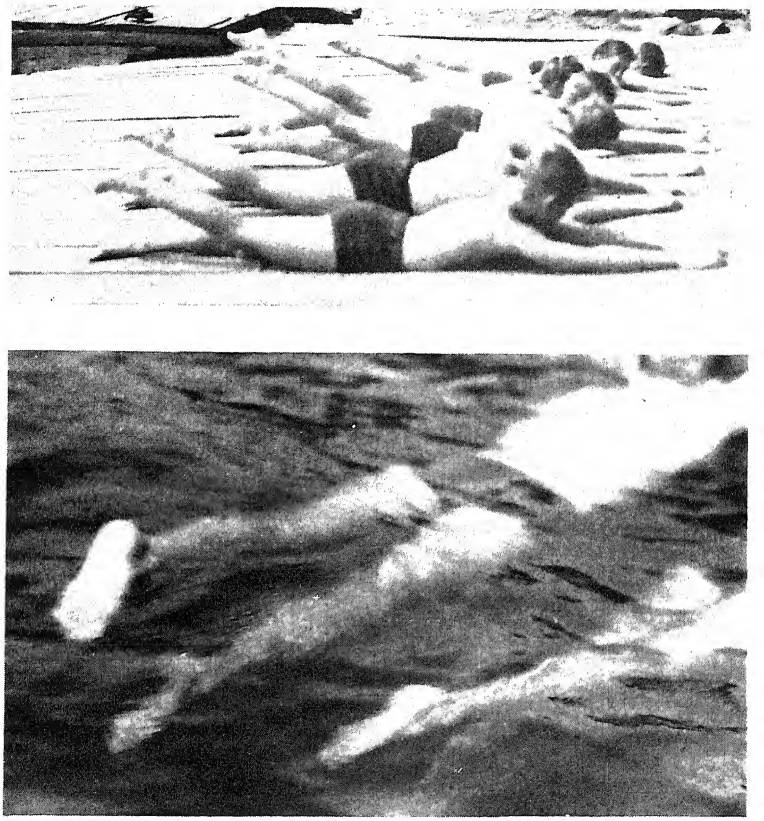
23. The force of the water breaks the straight line of the leg slightly at the knee and at the ankle as the leg goes up and down. The pressure is upward.



24. There is a little splash—not much—as the foot comes to the surface.



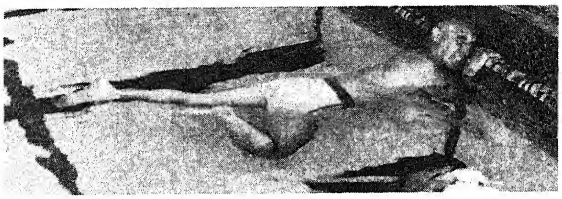
25. The lift is from nine to twelve inches.



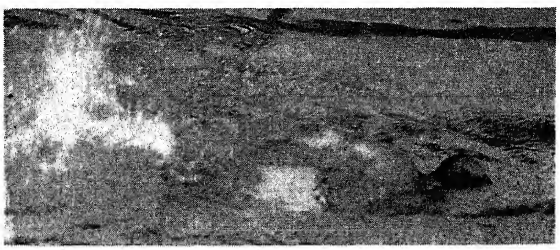
26. There should be a regular, even, kick. The rhythmic relation of the leg movements to the arm motion is for most of the best men swimmers three to one, that is, there are three beats of the feet to one arm stroke or six beats to a complete cycle of the movements of the two arms. This particular rhythm is called the six-beat kick. Formerly some men used a four-beat kick and a few swimmers use an eight-beat kick, especially for short distances. The six-beat kick seems best.

Some Common Faults in the Leg Movements

27. Frequently the legs are too much bent at the knees and at the ankles. In such a case the thigh, pulled up under the body, or the calf of the leg as it is bent back, and the "flat" feet furnish retarding surfaces.



28. Often the feet are lifted out of the water with considerable splash. They should come just to the surface of the water, for foot motion outside the water is completely wasted as far as the swimming process is concerned, and naturally makes the other foot go deeper and therefore resist more water, in order to have body balance.



29. Frequently the pressure of the kick is down rather than up. Force exerted by the feet in this direction retards forward movement. A down-kick with no other movement will pull the body backward in the water.

30. Too wide a kick retards the forward movement of the body.

31. A "scissors" kick instead of the "flutter" kick also interferes with the forward movement of the body.*

Breathing

32. Breathing is done by turning the face to one side so that the nose and mouth are out of the water. The *best* side for breathing is the one that feels most natural, for there seems to be no other basis of choice.

33. The face is turned easily, almost slowly, never with a jerk, to the breathing side just after the hand on that side has reached the bottom of its pull and during the time it is being lifted out of the water. (See cut 32.)

* Because it is extremely difficult to eliminate this fault in the case of those who have first learned the side stroke, in which the scissors kick is the normal leg stroke, I [Matt Mann] have not taught the side stroke for more than twenty years. After all, the crawl is the much more efficient stroke and it is just as easy for beginners to learn; there seems no point, therefore, in establishing a set of coördinations which would interfere with the successful mastery of the more efficient stroke.

34. The air is expelled through the mouth just as the head turns to the side. The important thing is to exhale; inhaling will follow without special attention.

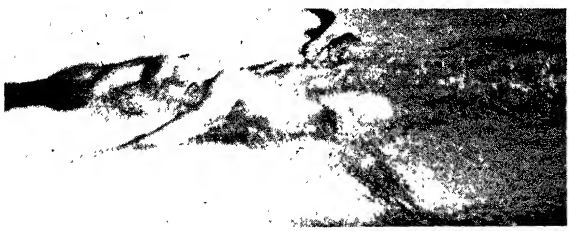
35. The mouth is kept open *all* the time. Both exhaling and inhaling are done entirely through the mouth. The necessity of breathing out and breathing in a large amount of air during the very brief moment in which the head is turned to the side makes it impossible to use the nose comfortably for either exhaling or inhaling.

Some Common Faults in Breathing

36. Sometimes the mouth is kept closed for part or all of the time and the nose is used, especially for exhaling under water. Such "trickle" breathing instead of the "explosive" breathing through the mouth has not proved satisfactory in any respect, probably because of the difficulty of timing it with a stroke of normal speed.

37. Often the inexperienced swimmer tries to inhale too great a quantity of air at one time. Gasping for breath, among other things, interferes with satisfactory relaxation in general.

38. Frequently the exhaling is done too late, interfering with the rhythm of the stroke.



Over and over we insist that all the movements of this stroke —the alternate pressing down with the hands and the throwing forward of the arms, the rhythmic three-to-one beat of the legs, and the properly timed turning aside of the head in order to

breathe—all these must be practiced so frequently that they become as unconscious as our movements of walking, in order that they can be done with the maximum of relaxation and the greatest economy of muscular energy.

Press down, don't pull back.
Bring the elbow out before the hand.
Throw *the hand forward; don't place it.*
Kick loosely; no stiff ankles.
Breathe through the mouth; keep it open all the time.
Get rhythm—an even, easy rhythm.

3

The Crawl Reversed—The Back Stroke

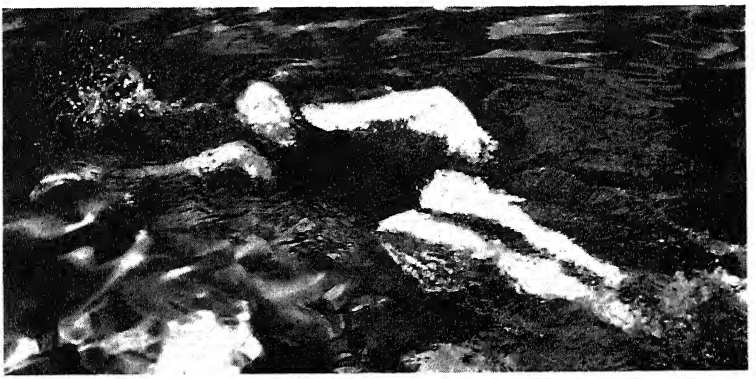
NEXT TO THE crawl stroke just described, the back stroke ranks highest in efficiency, if measured by the test of speed. The back stroke is also done with a considerable number of variations, but in fundamental pattern it is practically the crawl stroke done while the swimmer lies on his back rather than face downward. As a result, certain movements must be reversed.

The Arm Movements

1. The start of the back stroke is made from the following position. The swimmer lies on his back with the body nearly flat upon the water. The head is lifted a little; the proper angle is attained if the swimmer thinks of trying to watch his

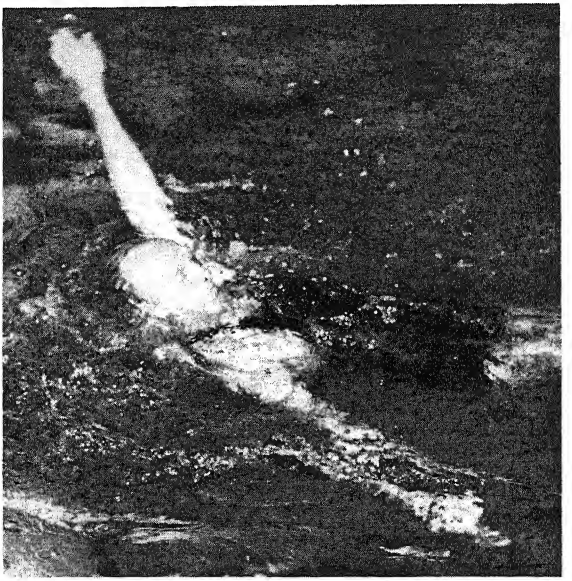
feet as they kick. The chin is thus down "in the neck." The arms are down at the sides, the legs together, extended straight, the toes pointed. The whole body is as relaxed as possible.

2. The left shoulder is lifted slightly over the water.

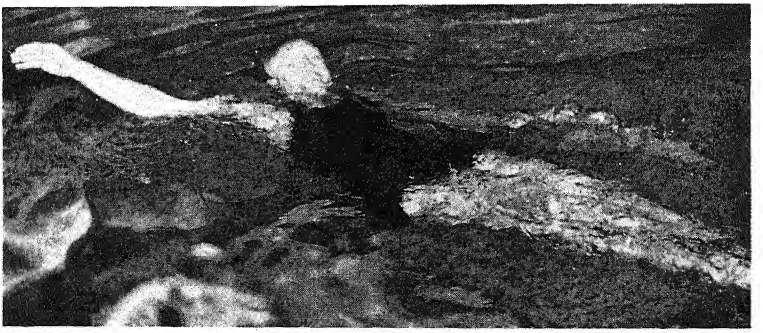


3. The left arm is then thrown *out* and *away* from the body over the water so that no water is splashed in the face. The arm is thoroughly relaxed and is therefore *thrown,* not placed.

4. The hand is dropped into the water when the arm is just a little past the height of the shoulder.



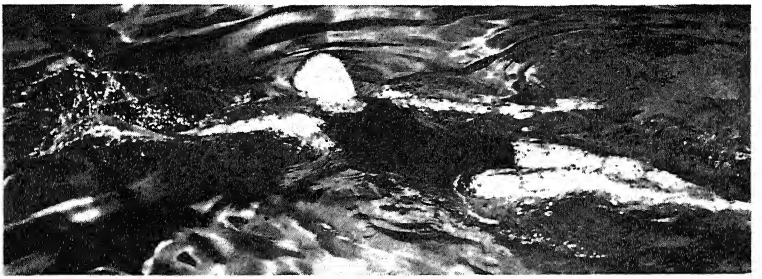
5. As the left hand is dropped into the water, the right shoulder and arm start through the movements just described for the left arm in 2 and 3 above.



6. The hand is dropped *palm down* until it is about six inches under the water.

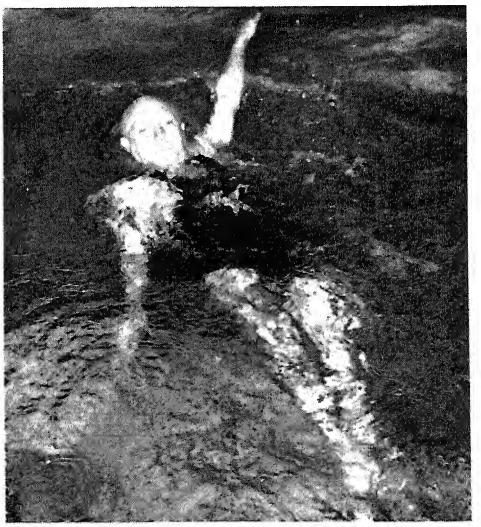
7. Pressure is then applied to the water by the arm and hand. The elbow is kept straight but the hand must *grip* the water. The pressure of the water should be felt on the finger tips.

8. The arm makes a regular sweep six or eight inches deep in the water. The arm acts as an oar of a row-boat.



9. The arm and hand are "anchored" in the water and the body passes by. The swimmer should always have the feeling of going past his hands—not of bringing the hands back to the body.

10. During this sweep of the right arm six or eight inches under the water, the left arm is thrown back over the water in

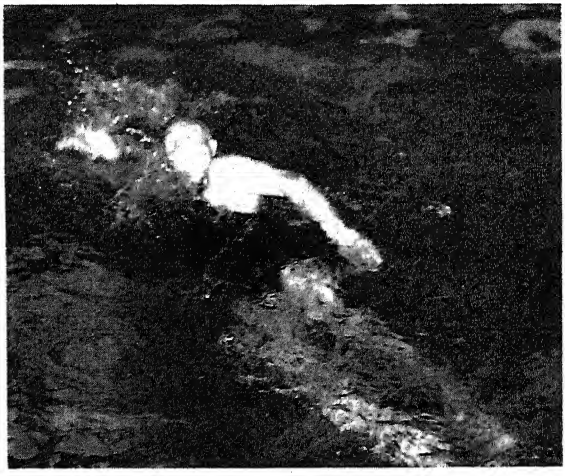


preparation for the pull on the left side. The arms operate as one straight unit across the body like the double paddles of a canoe. There is no pause or wait in their motion; as one pulls, the other recovers.

Some Common Faults in the Arm Movements

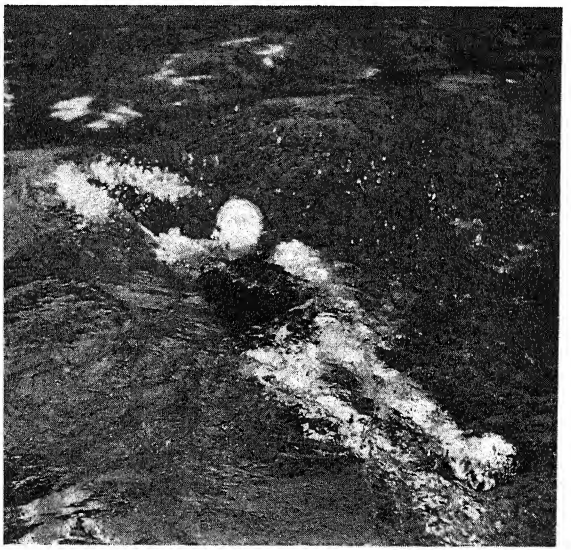
11. The head is often too far back; the chin is not drawn into the neck. In this position the swimmer looks straight up rather than at his toes and considerable water often comes over the face.

12. The body often rolls from side to side, pushing the shoulders alternately down into the water. The result is to increase the amount of water resistance, retarding progress.



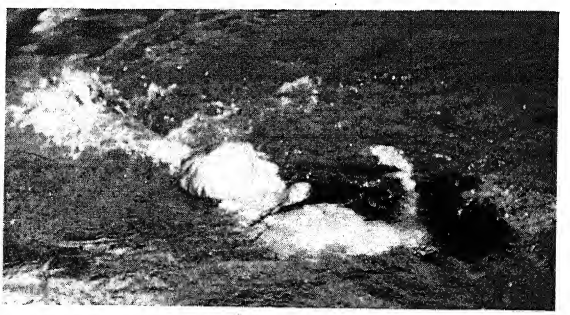
13. Frequently in the recovery the arm is brought up nearly straight over the head. As a result, water is splashed in the face, interfering with the breathing.

14. The hand then catches the water over the head instead of out to the side just above the line of the shoulder. There is thus considerable pressure of the hand against the water which does not serve to advance the body.



15. The arms are often stiff and not relaxed—thus wasting much muscular energy.

16. Often the elbow is crooked and the hand pulled in to the body, thus missing the full value of the stroke.



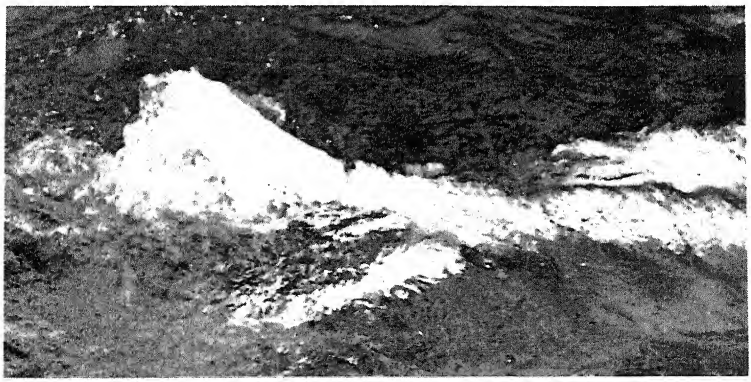
17. Frequently the hands go too deep on the pull, rolling the body and missing the maximum leverage in the pull.

18. Very often too much pressure is exerted, resulting in pulling the hands through the water rather than having the body pass by "anchored" hands.

19. Sometimes the two arms do not operate as a single straight unit across the body, thereby spoiling the rhythm of the stroke.

The Leg Movements or Kick

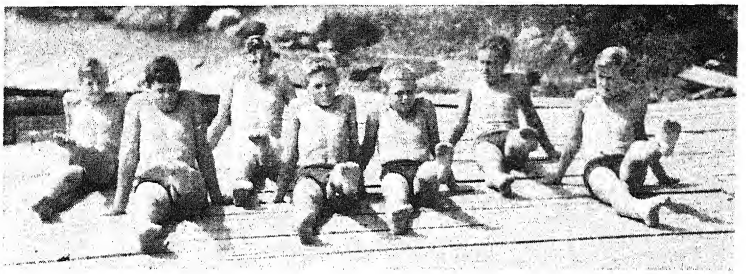
20. The back stroke kick is the crawl kick reversed. The toes are pointed and the pressure is up, making the instep the foot surface that furnishes the most driving force.



21. The leg swings from the hip and is thoroughly relaxed.

22. The leg bends a little at the knee and at the ankle. There is a "whip" in the ankle action, as if to shake the foot off the leg.

23. The maximum up and down distance between the feet in the kick is from ten to twelve inches.

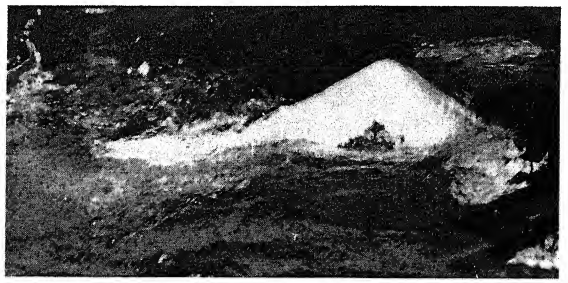


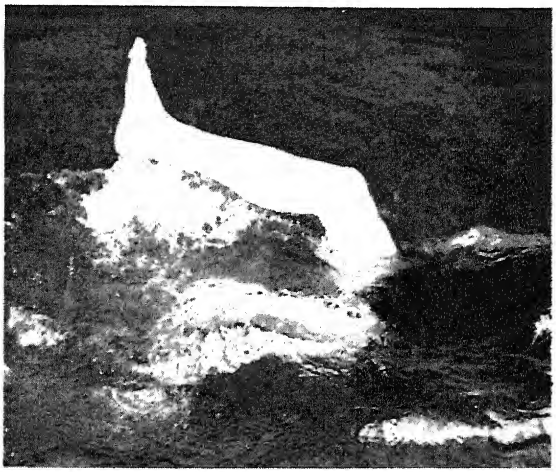
24. The best rhythm is three foot lifts to one arm stroke, or six foot lifts to one complete arm cycle, that is, two arm pulls. This is called the "six-beat" kick.

Some Common Faults in the Leg Movements

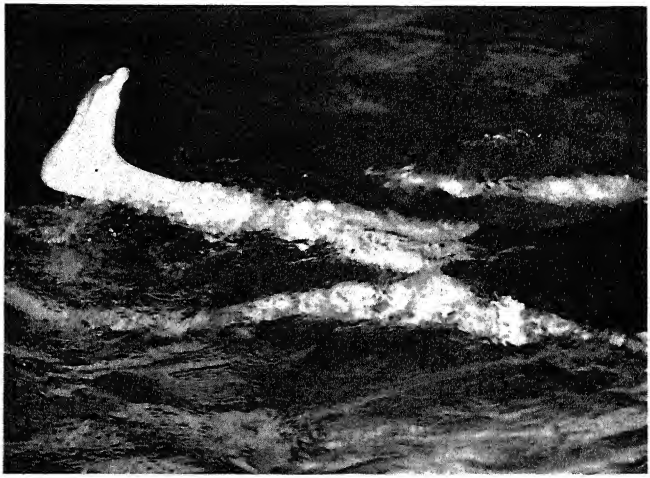
25. The legs are often stiff (not relaxed) and thus lack the slight bends at knee and ankle that are necessary to present the maximum driving surface.

26. Sometimes the legs do not swing from the hips resulting in the so-called knee kick with the thigh raised.





27. Often the ankle is stiff with the toes turned up and not pointed. "Flat feet" of this type retard the swimmer.



28. Stiff legs usually produce a too shallow kick with little driving force.

29. A too deep kick is the result of forcing the kick, usually with down stroke pressure.

30. "Thrashing" with the feet (an irregular rhythm and

time relation to the arm stroke) uses a great amount of energy and gives the body little or no aid in its progress through the water.

Pull in your chin and look at your toes.
Arms out over the water, not over the head.
Anchor the hands.
"Shake the foot off!"

4

Our Oldest and Newest— The Breast Stroke

THE BREAST STROKE is probably the most argued-about stroke in swimming today. It is the oldest of our modern recognized strokes for swimmers and up to 1934 seemed the most stable. Since that time, however, the stroke has been revolutionized, and the changes have brought about rapid reductions in the records for this stroke. Within ten years the American record for the 200-yard distance with the breast stroke has been brought from 2 minutes and 48.2 seconds to 2 minutes and 22 seconds. These recent developments in the methods of the breast stroke can perhaps best be shown by setting forth the processes of the stroke under three headings.

I. The conventional Breast Stroke.
II. The "Butterfly" or "Flying Fish."
III. The "Fish Tail."

The fundamental regulations for the breast stroke are three:

1. The body must lie on the water breast down—that is, the shoulders and the hips must always be parallel to the water surface.

2. Both arms must stroke at the same time and execute duplicate movements.

3. Both legs must also stroke at the same time and execute duplicate movements.

In a single sentence, the rules require that the right and the left sides of the body describe exactly parallel movements at the same time, while the body lies flat on the water breast down. The recent changes in the breast stroke have not violated these fundamental regulations but have simply modified the methods of their application.

I. THE CONVENTIONAL BREAST STROKE

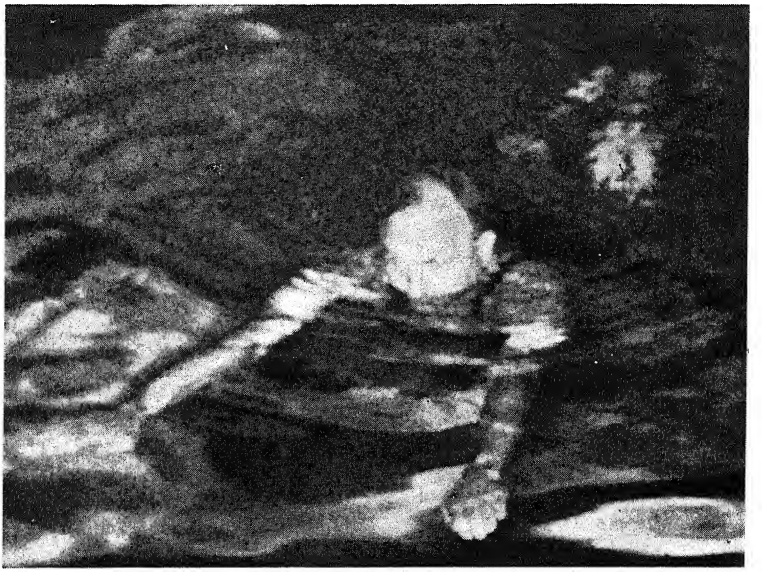
The breast stroke is a more complicated swimming stroke than either the crawl or the back stroke. This greater complexity shows itself especially in the timing of the stroke. *Timing*, in the swimming vocabulary, refers to the relation of the motions of the arms to the motions of the legs and to breathing. In the breast stroke, the timing of the arm and the leg motions will be seen to be especially important.

The Arm Movements

1. For starting the breast stroke the body lies flat on the water, chest down. The face is out of the water, the chin pushed forward. Both arms are drawn in to the chest, the hands pointing forward.

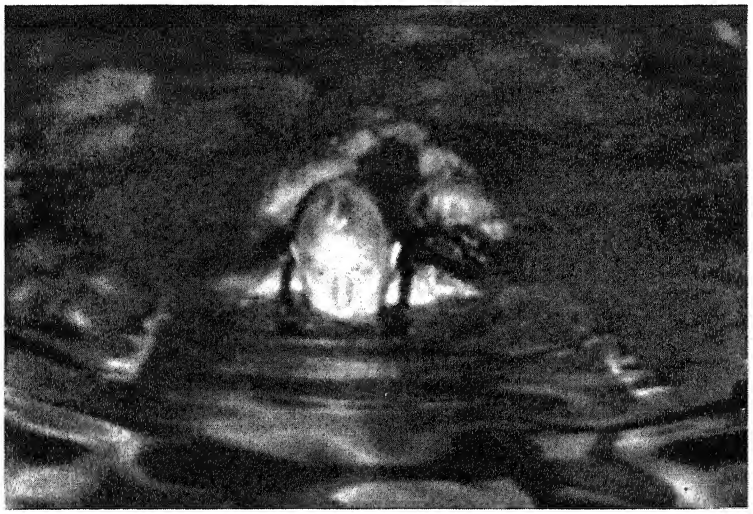
2. The arms are then fully extended straight forward, but not stretched too far. The palms of the hands are down and the face flat in the water. The arms are maintained in this position for a second or two for the "ride."

3. The palms of the hands are then turned about forty degrees outward and downward.



4. Both arms sweep outward and backward through an arc of one-fourth of a circle. The breathing is done during this sweep of the arms.

5. At the completion of this quarter-circle, the arms are relaxed and brought back to the chest in the original position. The hands are "turned on the wrists" as the arms are brought back.



6. The length of time given to the arm pull backward through this quarter-circle, together with the bringing of the hands back to the chest in starting position, is less than that of the "ride" with the hands in front.

7. During the arm stroke the body should seem to the swimmer to go more over the top of the water than through the water. He should feel a pressure of the chest downwards during the "ride." (See also statement 26.)

Some Common Faults in the Arm Movements

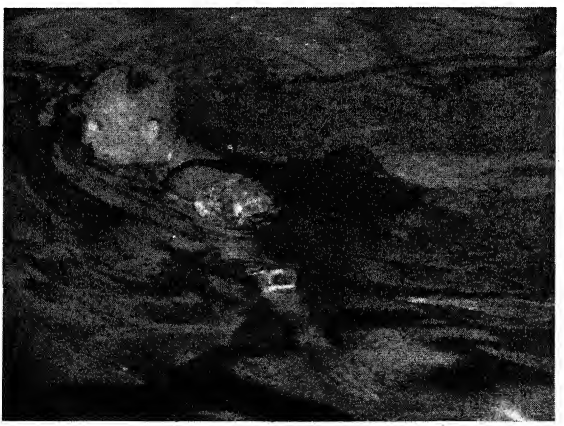
8. The arms are often stretched too far forward and therefore cannot be thoroughly relaxed.

9. The wrist is sometimes bent back so that the palms of the hands push against the water.

10. The arms are frequently not kept in front for the "ride" but started around in the pull immediately or too soon.

11. The palms of the hands are often not turned so as to grip the water effectively. There must be the feeling of water pressure on the finger tips.

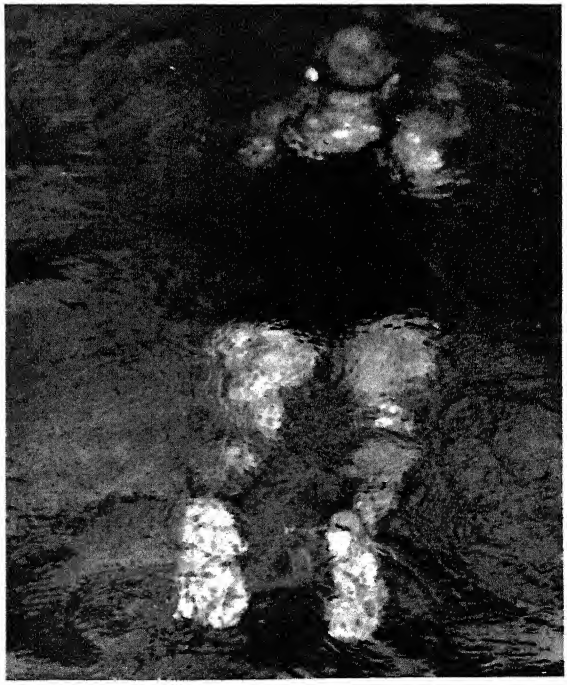
12. The arms are frequently brought too far back. There is no power beyond the one quarter of a circle.



The Leg Movements

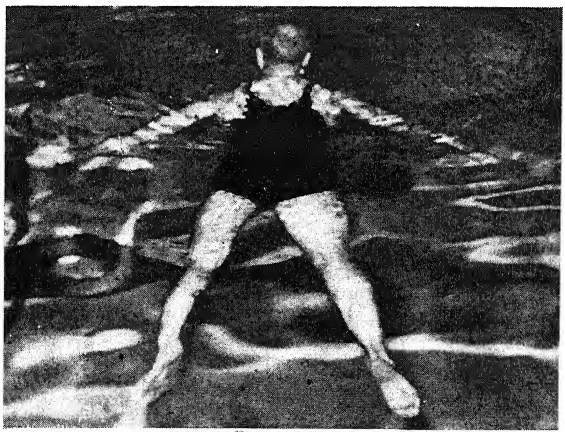
The breast stroke kick has often been called the "frog" kick, but this term gives a wrong impression of the leg movements. The frog simply pushes his legs back and the water pressure opens his web feet, which, because of their immense size in comparison with the size of the whole frog, give him a tremendous drive. Man can get no such drive by pushing the water with the bottoms of his feet. There are, however, two types of kick for the conventional breast stroke: (1) the "wedge" kick, and (2) the "round-house" kick. The processes of the wedge kick will be given first and the special differences of the round-house kick will follow in statements 18 to 20.

13. In the starting position for the kick the legs are outstretched behind, loosely together, with the toes pointed.

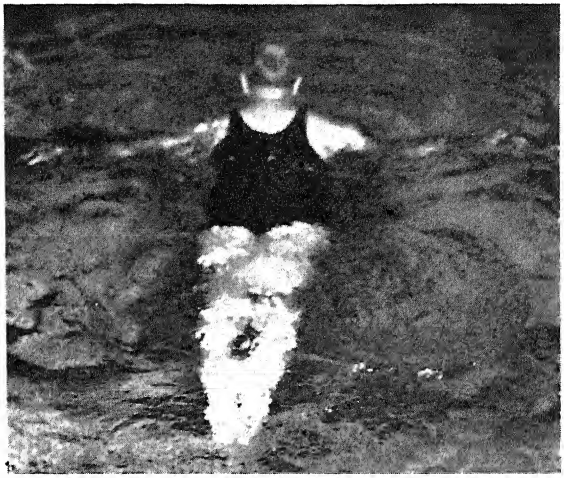


14. The knees are first started away from each other and then the feet begin to separate—they *float* away from each other. The toes are pointed out and the heels are in, in order to use the bottom surface of the foot completely in the drive to follow.

15. The heels are driven down hard by straightening the knees, keeping the feet about as far apart as they were when the legs were drawn up—that is, twelve to fifteen inches. This movement produces a drive by means of the pressure of the water against the flat of the feet.

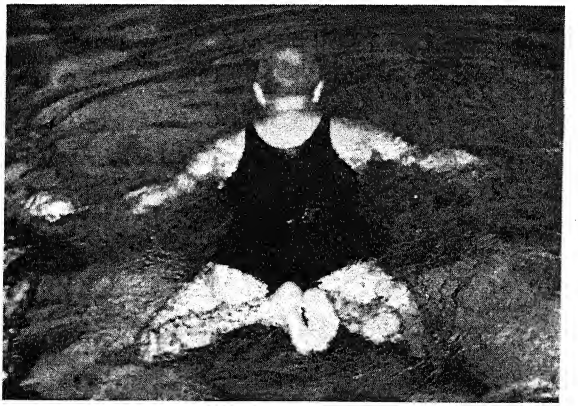


16. Then the legs are snapped together or nearly together as part of the same movement (described in 15), thus squeezing out the water from the wedge between the legs.

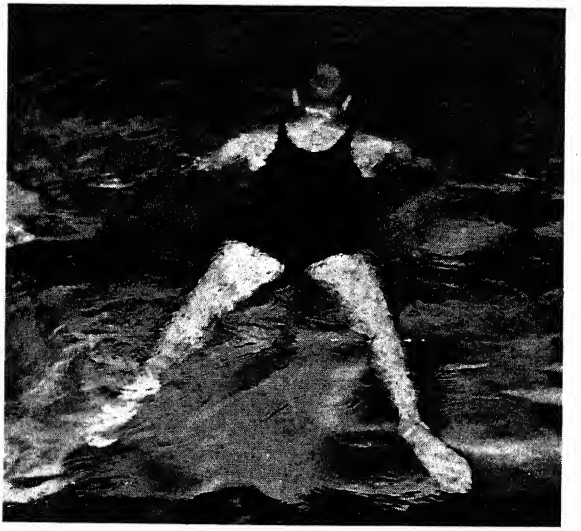


17. As soon as the feet are snapped down and the legs brought together, they are relaxed immediately. There is then a motion and a feeling of the feet getting a lift at the end of the down stroke but this is really only the natural floating to the surface which accompanies the relaxation. The feet are then allowed to float a little apart as the swimmer "rides."

18. The round-house kick differs from the wedge kick first in the fact that, when the legs are drawn up, the feet are not allowed to float apart as indicated in 14, but are kept well together.



19. Then the legs are driven outward, with the feet reaching as far out as possible, until the legs are fully stretched outwards.



20. Then, as the legs are straightened out, the feet are whipped together, producing a drive of great power.

Some Common Faults in the Leg Movements

21. The knees and feet are often forced or snapped up and out rather than allowed to *float* away from each other.

22. The feet are frequently not "flat footed," and thus miss the pressure from the entire bottom surfaces of the feet.

23. The legs are often not forced or snapped together, thus losing the driving power that comes from squeezing out the wedge of water between the legs.

24. The legs and feet are often not relaxed at the end of the stroke and do not float up. They remain down, retarding the ride.

25. Sometimes the round-house kick is too narrow, thus missing much of the force of snapping the legs *together*.

Timing and Rhythm

26. The arms are thrust forward just before the time the legs are being driven outward or downward and snapped together. The arms remain forward to ride out the full benefit of the powerful leg stroke. The face is down in the water and the legs float relaxedly behind during this ride. The swimmer should feel a direct pressure of the chest downwards, so that

the hips and legs will immediately come to the surface and get full benefit of the ride after the kick.

27. The arms are swept outward and backward and are brought in to the chest as the legs are drawn up and move apart.

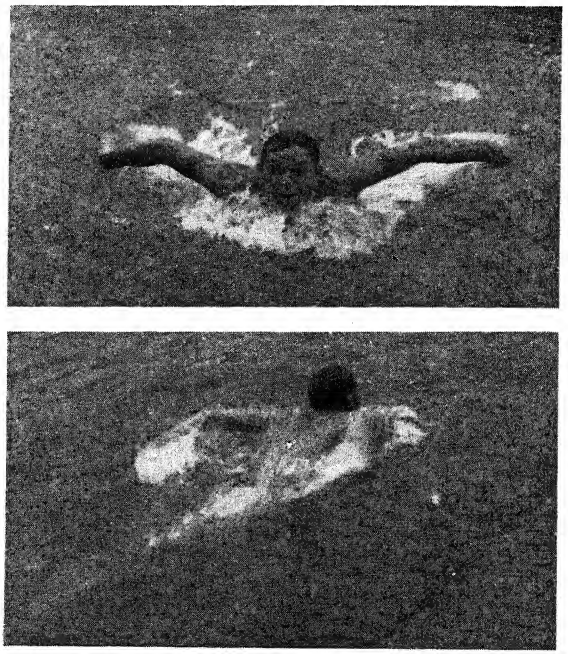
28. The breathing is done during the time the arms are sweeping outward and downward. At this time the face is out of the water and the chin thrust forward.

II. THE "BUTTERFLY" OR "FLYING FISH"

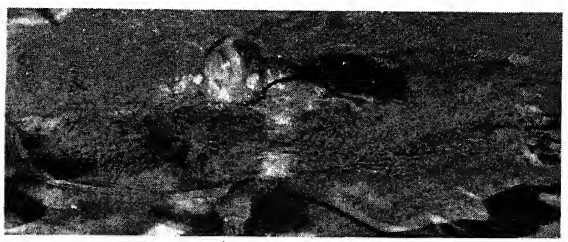
When Erich Rademacher of Germany, the breast stroke Olympic champion of 1920, first visited the United States, it was noticed that, as he swam into the turn at the end of the pool, he would make the last stroke with both hands lifted out of the water. This "flying" at the end of each length seemed to give him considerable advantage. About six years ago a young swimmer, Lester Kaplan, of the College of the City of New York, developed a stroke built upon this "flying" into the turn. For the whole distance of a hundred yards he used this method, which had before that been used for only one stroke at the end of each length. This new breast stroke, called the "butterfly" or "flying fish," was first used in intercollegiate competition, by special agreement, in a dual swimming meet between the University of Michigan and an all-star C.C.N.Y. team. The new stroke was used by Lester Kaplan against John Schmieler, who was at that time the National Intercollegiate champion in the breast stroke. For three lengths, or seventy-five yards, the champion was left well behind; but Kaplan was not able to maintain the pace for the last length. The value of the new stroke had been thoroughly demonstrated, however, and, although it had not been generally authorized, the breast stroke swimmers during the year following usually used it for from three to six strokes every length. Finally the International Federation ruled that the over-arm out-of-the-water recovery in no way violated the fundamental regulations of the breast stroke, and the National Collegiate rules committee changed the wording in the rule book to fit the method used in the new stroke. With practice it was possible to "fly" the whole 220 yards, as Jack Kasley proved when in 1936 he set new world's records for 200 yards, 200 meters, and 220 yards. With this stroke, the National Intercollegiate time for the 200-yard breast stroke rapidly fell from 2 minutes and 30 seconds to 2 minutes and 22 seconds. The important points in the process of the stroke are the following:

The Arm Movements

29. The arms are thrown outward from the chest and forward over the water. During this throw the elbow is a little higher than the rest of the arm and the whole arm is relaxed. The palms of the hands are down.



30. As soon as the hands fall on the water they start down in the arm pull. There is no "ride" as there is in the conventional breast stroke.



31. The pull is straight down. The arms do not sweep around at all, but press vertically down (see cut 30), giving the body a tremendous lift over the water.

Leg Movements

32. The kick for the "butterfly" is the regular wedge kick described in statements 14, 15, 16, and 17. The knees, however, are drawn a little more underneath the body and the legs do not spread so far apart.

Timing and Rhythm

33. The arms are thrown forward just at the finish of the leg drive. The leg drive thus serves to push the body up on top of the water.

34. The hands are pressed down through the water while the legs are still straight and floating behind. Thus the leg stroke seems to precede completely the arm stroke, but there is no wait whatever between the two.

35. The breathing occurs during the time the arms and hands are being pressed down. A better "slide" seems to be accomplished by breathing every other stroke than by breathing every stroke.

III. THE "FISH TAIL"

Just as the "butterfly" revolutionized the arm movements of the breast stroke, the "fish tail" would revolutionize the leg movements—if it were allowed. It has not yet been accepted

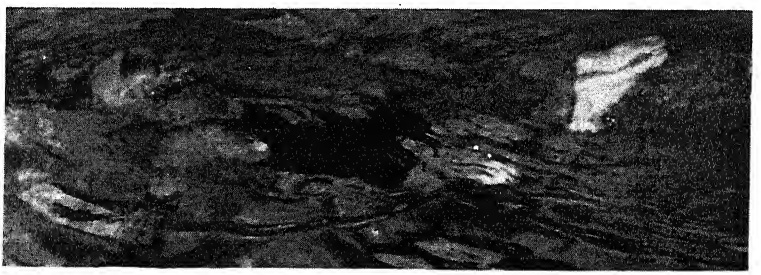
for competition, although it seems to comply with the fundamental requisites of the breast stroke, for certainly in doing it both legs describe duplicate movements. It was developed by David Armbruster, swimming coach at the University of Iowa, and we have seen one of the Iowa swimmers, Sieg, in an exhibition 100 yards, break the existing world's record by a full second. The movements of this stroke are as follows:

Arm Movements

36. The arm movements in the "fish tail" are like those described for the "butterfly" in statements 29, 30, and 31.

Leg Movements

37. The legs are kept close together; there is no spread as in the kicks usually used in the breast stroke.



38. The movement is a rhythmic thrashing of the legs up and down together, with the pressure surface alternately the backs of the legs, especially of the lower legs, on the up movement, and the fronts of the legs on the down movement.

5

Beginners—Some Principles for the Teacher

A VERY LARGE number of those who want to learn to swim are adults or mature young people—pre-adults. Probably most of those enrolled in regular swimming classes should, for our purposes, be classed as adults. This fact is exceedingly important, for those who have not learned to swim as very young children have necessarily built up certain somewhat fixed attitudes toward the water. They have read the accounts of drownings that our newspapers feature after each hot week-end of the summer. They know that our rivers and lakes take several thousand lives each year and they have heard a great deal concerning the "cramps" and "exhaustion" of so-called good swimmers, and the "grasping at a straw" of the struggling non-swimmer. All of this experience frequently tends to build up an attitude of fear toward the water; at the very least, there is nearly always in the adult non-swimmer a feeling of helplessness in water, that can easily turn to fear. These adult attitudes must be understood and taken into account by any teacher who would succeed not only in developing in his pupils the ability to swim but also in cultivating in them a love for this art that has so much to offer to man in the way of health and enjoyment.

All too frequently instructors have forgotten their own learning state and are so insensitive to the feelings of the learner that they cannot understand the mental difficulties with which he is struggling and make provisions for eliminating them. It seems worth while, then, to state specifically a few of the simple and rather obvious things that should be kept in mind as one takes on a class of beginners.

1. Their "water experience" has been usually limited to the bath tub and therefore the mere feel of standing in water up to their shoulders is a new sensation they must have time to get used to.

2. The physical point of view from which they see the water is new and strange, for they have now, probably for the first time, their faces on a level with the surface of the water, and they look over it with a new vision.

3. They have been in the habit of shutting their eyes whenever there was any water on the face.

4. They have not been used to having water over the face to an extent that makes necessary a special breath control. Usually the breathing apparatus—the nose and mouth—have been covered only for an instant.

5. They do not have and probably never heard of "water balance." Perhaps lack of balance in the water is the thing that produces the most helpless feeling in beginners. They have at an early age developed a walking balance, for which the feet must be on something solid. Now, if the feet are off the bottom, their balance is completely lost until they develop a new method by which they can maintain their balance in the water. With hands and legs they must learn to maintain both a longitudinal balance and the equally important sideways balance.

6. They have had no occasion to build up the necessary coordination of arm and leg movements. With attention, either

the arm movements or the leg movements are made without difficulty, but considerable practice is necessary to set up the habit of having both the arms and legs working together in harmony.

These, then, are some of the factors that produce that helpless feeling of the beginner as he first goes into the water—a feeling that can very easily turn into fear and panic, a feeling that must be replaced by confidence before progress can be made in swimming. The series of steps set forth in this chapter, and the suggestions accompanying the descriptions of these steps, provide the program of procedure that our experience has shown to be most successful in dealing with the problem of teaching beginners. The steps of this program are presented under three heads:

1. Experience in the water and "water balance."
2. Coördinations and "getting on top of the water."
3. Off with the belts! Actually swimming.

It is taken for granted that the crawl stroke is the first stroke to be learned by the beginner, and the particular movements here indicated are chosen because they lead directly to the mastery of that stroke.

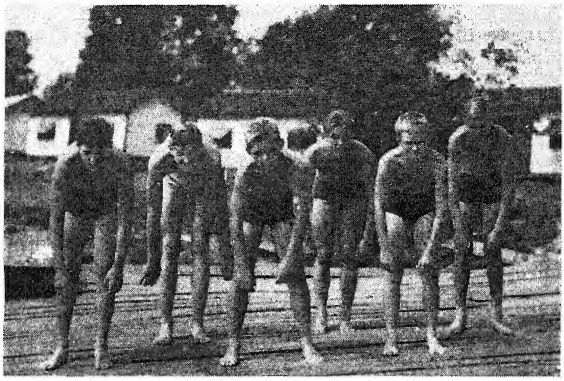
Experience in the Water and "Water Balance"

1. Before the beginners enter the water, the arm motions of the crawl stroke are explained and practiced, so that there may be a clear understanding of what movements these beginners will be trying to make when they get in the water. The important point is that these movements are *the thing upon which the attention of the beginners is to be centered while acquiring water experience.* Such concentration upon something outside themselves and their own new sensations is especially necessary

for those who have a fear of the water or who may be inclined to panic. The precise method of this instruction is as follows:

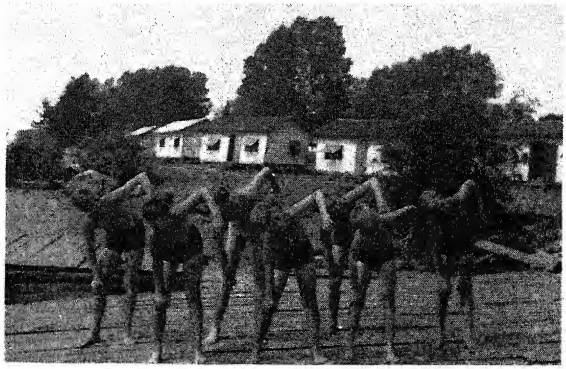
(a) Have the class line up facing the instructor, taking room enough to swing the arms for the arm stroke of the crawl.

(b) Each one should stand, as relaxed as possible, with his feet twelve or fifteen inches apart, leaning forward a little and



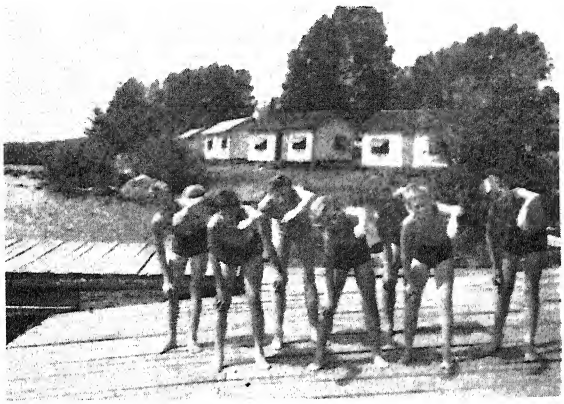
bending from the waist. Both arms should hang straight down from the shoulder. The fingers will be a little apart if the arm muscles are satisfactorily relaxed.

(c) The right shoulder is lifted first and then the right elbow

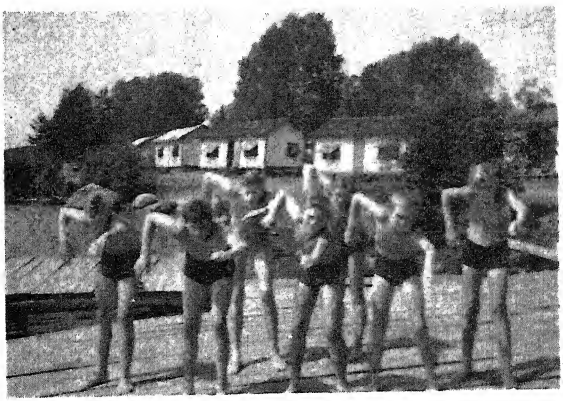


(leaving the forearm hanging very loose) until it is as high as possible, without turning the body.

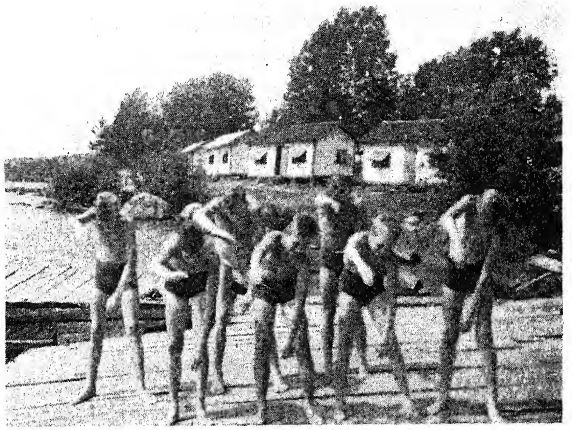
(d) The right forearm and hand are then thrown forward so that the arm reaches straight forward from the shoulder.



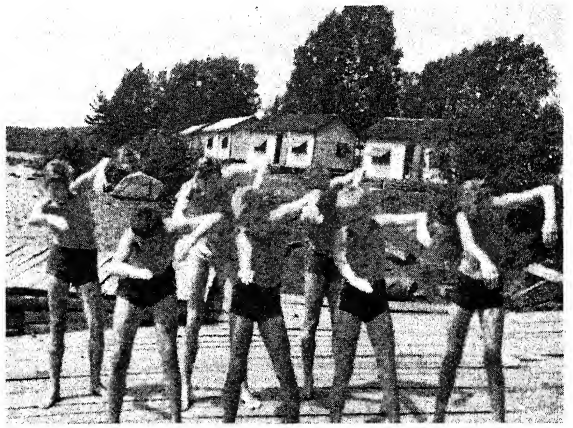
(e) As the right arm remains in this position, the left shoulder and elbow are raised and the left forearm and hand are thrown forward.



(f) As the left forearm and hand are thrown forward, the right hand is brought straight down under the middle of the body until it hangs straight down in the position from which it started.



(g) The same process is then started over again and, as the right hand is thrown forward, the left hand is pressed down.



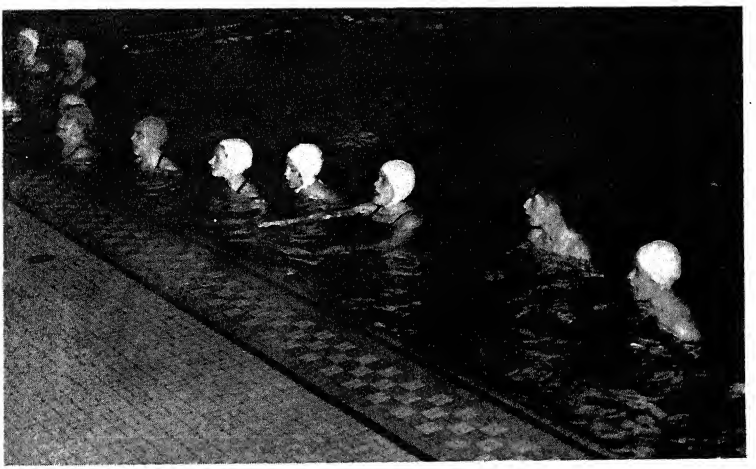
(h) This drill is continued until there is some feeling of the rhythm of the swing of the arms. The movements must never

be hurried, and the muscles must be kept as relaxed as possible.

(i) As the arm swing is acquired, the beginners are told to turn the face to whichever side seems most natural for breathing, when the hand of that side is pressed down from the forward position.

2. When the beginners have thus a clear understanding of these movements, they are furnished with inflated rubber rings and are ready to enter the water. Each one should be given plenty of support—two or three rings if these will give him more confidence. The rings should be placed around the waist for the best longitudinal balance.

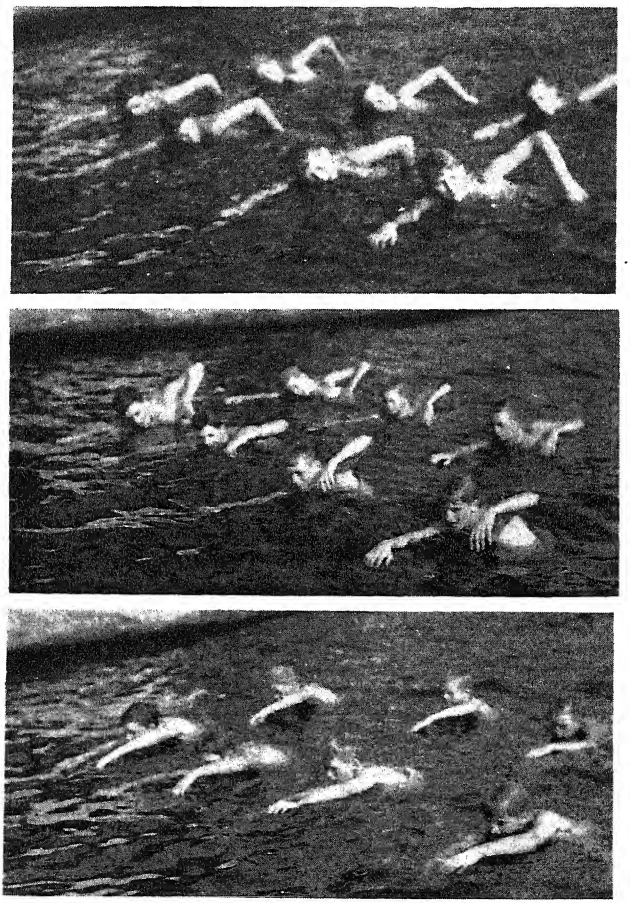
3. The beginners then enter the shallow water and, facing the shallow end of the pool, walk slowly backward until they are in water up to their shoulders. The instructor should stand on the deck of the shallow end so that the pupils face him and see that he is watching each one.

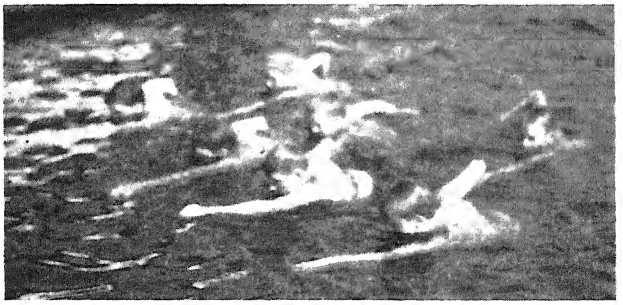


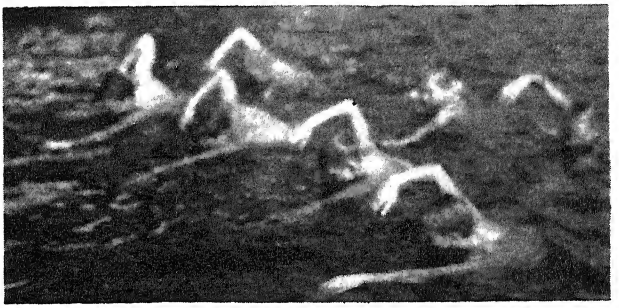
4. The beginners are then directed to reach out their arms in front of them and lean forward until their feet "want" to leave the bottom of the pool. The chin should be forward, the mouth open. It is exceedingly important that they should breathe easily and be relaxed. To this end it is good to insist that they

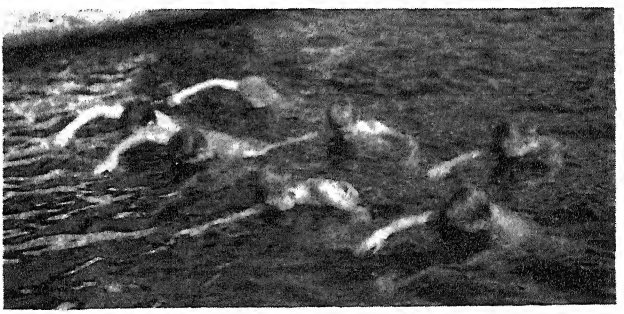
smile and show their teeth, because tight lips accompany tense muscles, and an open smile helps to prevent becoming tense.

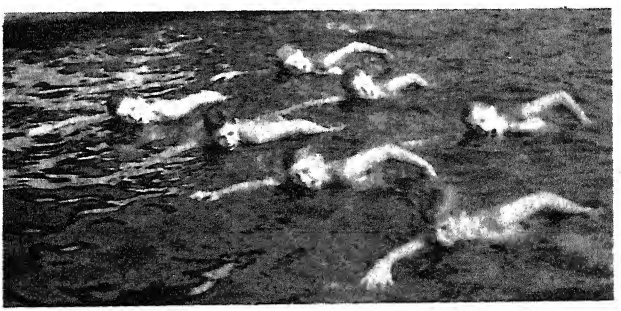
5. A little hand and arm action should be started as the pupils slowly move in to the wall of the shallow end of the pool. This arm and hand action consists in pressing the palms of the hands down into the water alternately. In most cases the pupils will be walking. At least the toes will be touching the bottom of the pool for balancing. It must be remembered that real beginners have not attained any water balance. It will come only











with experience in the water and really cannot be taught. It is parallel with the balancing that the child learns as he develops the ability to stand erect and to walk. It is like learning to ride a bicycle. Adults can be told the problem and may in that way more quickly sense the feeling of balance, but there seems to be no direct instruction possible in this early effort to acquire balance in the water. It is therefore necessary in the first trial or two that the feet of the beginners be kept in contact with the bottom or near the bottom so that no real loss of balance and its accompanying fright occurs. They should be told and should test the fact for themselves that by pressing hard directly down with their hands, their feet will be brought forward under them so that they can stand up.

6. Progress, however, should be made as far as possible in getting the feet off the bottom altogether, and this is accomplished as water balance is acquired. Then the legs can begin an easy swing (not really a kick) in time with the movements of the hands. After each time that the pupils have moved in to the wall, they should stand and rest and breathe slowly *in and out of the mouth.*

In all the six steps of this first procedure the instructor should:

(a) *not* be in the water with the swimmers but out where all can see him and where he can see all—*all* the time;

(b) watch the pupils in order to anticipate and prevent difficulties and thus any feeling of panic in the group;

(c) keep the class working as a unit, for the social pressure of the group will help in having all do as the instructor directs;

(d) keep talking most of the time in order to center attention on himself and not let the pupils concentrate on their own actions. The spirit of the class should not be too serious but one of light good humor. Jokes are helpful in keeping the spirit of relaxation, but *never* ridicule of the swimmers. Some of the phrases which not only give directions to the pupils but also help to keep their attention off themselves and centered on the instructor are:

Open your eyes; look where you're going.
Smile! Show your teeth.
Keep your mouth open all the time.
Spit it out when it comes in.
Breathe! Breathe! Exhale!
Easy, just easy.
Lift up *your feet—they go down anyway.*
Reach; reach; reach.
Altogether now, let's race across.
Relax! Smile! Relax!

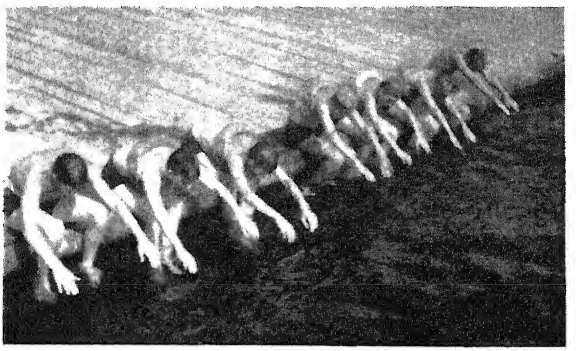
The statements following continue the development of the program for the beginner. Throughout all these activities he

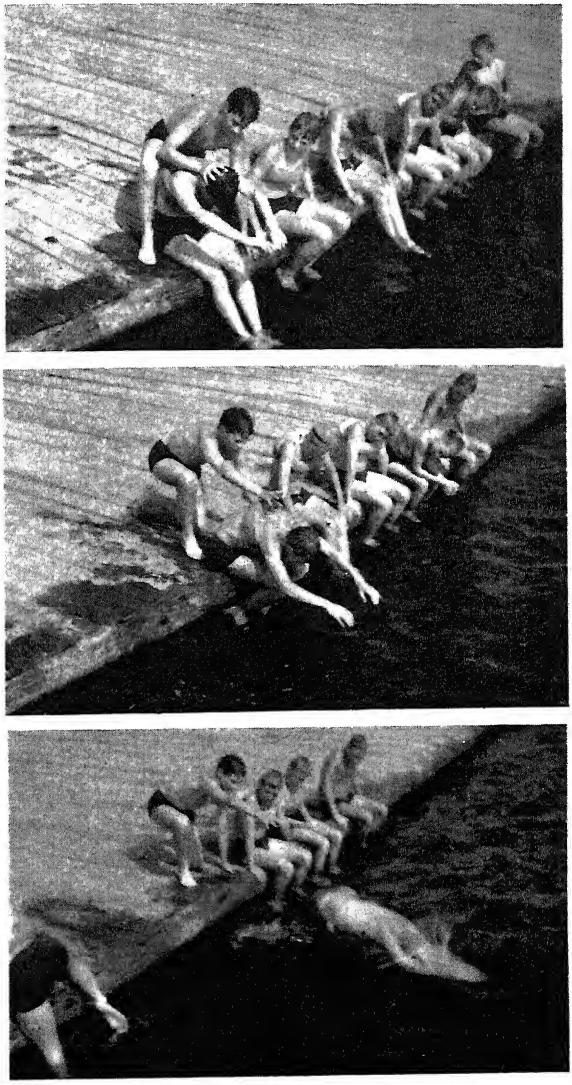
is still equipped with one or more inflated rubber rings as a support.

7. When sufficient water balance has been acquired so that the feet are off the bottom of the pool for even a short time, then the instructor should start the pupils *thinking* about "diving"—that is, getting into the water without going down the steps. Considerable talk is necessary before the pupils at this stage of their water experience will believe that the instructor really means to have them *dive*. Yet the whole effect upon the thought and attitude of the beginner is so valuable that it is worth while to try it, after sufficient time has been taken to prepare the way by suggestion.

8. When the time has come that the instructor believes is right for trying this "dive" and he has made a mental note of those who seem most courageous and are making most progress, he orders the whole class out of the water. Two or three of the most courageous and advanced are directed to sit on the edge of the deck with their feet resting on the edge of the scum trough. Then they are asked, one at a time, to extend their arms, close their eyes, take a good breath, push out over the water, and *stand up* in the pool.

9. After two or three have done this "push dive," watched by the other members of the class, all in the class are lined up





sitting on the edge of the pool and directed to go, one after another—the more courageous ones first, and the others with whatever little help is necessary to make them push off. The

instructor stands behind each one as he prepares to go, in order to encourage and help him.

10. After all have several times done this push dive, ending in standing on the bottom, they are directed to do the same push dive but, instead of stopping at the end of the dive, to continue over to the other side of the pool. As soon as the pupil has sat down on the edge of the pool the command "Go" should be given in order to prevent any hesitation, and then the instructor should continue with loud directions such as "Reach! Reach!" or "Kick, Kick, Kick!" or "Take your time! Easy!" until the pupil has crossed the pool. These loud directions serve to take the attention of the pupils off the water and themselves and center it on the instructor. When the pupils have thus gone in from the side with a push dive and have crossed the pool without touching bottom, it has a good psychological effect to point out that even *now* it is not essential for them to have *shallow* water, inasmuch as they have not used the bottom at all and the water might just as well have been thirty feet deep.

11. From twenty to twenty-five minutes is long enough for a single lesson for these beginners—in fact it is much better than a longer period. They should be sent out of the pool in the midst of laughter and talk, before they have become tired and when they still want to go on.

Coördinations and "Getting on Top of the Water"

12. Succeeding lessons should begin with the repeating of the procedures already familiar to the pupils:

(a) The practice of the form and rhythm of the crawl stroke arm movements, as the pupils stand on the deck before entering the water.

(b) The walking across the pool practicing the arm movements in the water. Here the face is rhythmically turned aside to breathe but kept out of the water all the time.

(c) The getting the feet off the bottom and maintaining balance in the water.

(d) The push-off dive and proceeding across the pool.

13. There should then be added the practice of pressing the hands down into the water and acquiring the feeling of scooping the water under the body.

14. Next, the attention should be turned to the leg movements, and the feet be lifted alternately. The legs must be kept as relaxed as possible and swung from the hips, not primarily bent at the knees.

15. There must be much practice of both the arm and the leg movements until quite naturally, without any *thinking*, "both ends work at the same time"; that is, the hands press down alternately while the feet kick up and down in a steady rhythm. The precise nature of the particular motions of the hands or the feet is not important at this time; but that both the hands and the feet should be moving at the same time (the hands pressing down and the feet lifting up) is all-important.

16. When the habit of working both the hands and the feet at the same time has been established, the learner will feel himself "on top of the water" and be ready to swim without support.

In all this practice the instructor should talk almost constantly, using over and over again the phrases of direction.

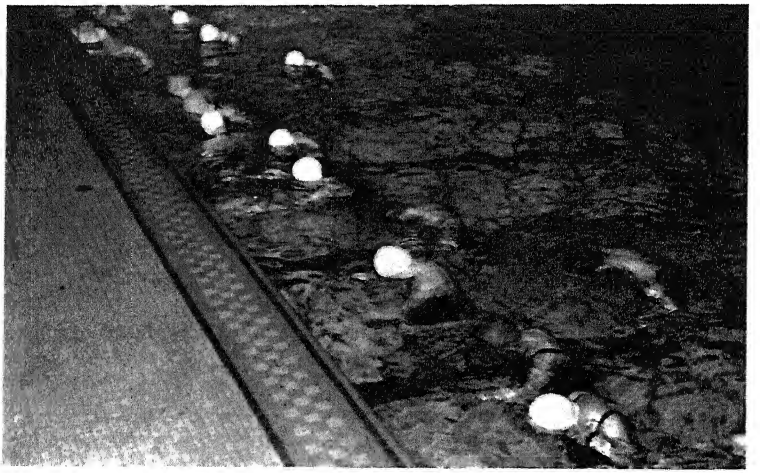
Open your mouth, and breathe naturally.
Exhale! Exhale! The inhaling will take care of itself.
Reach! Reach!
Press down! Don't pull back.
Kick, kick, kick!
Don't be in a hurry. Take it easy.
Smile! Show your teeth.
Relax! Always relax.

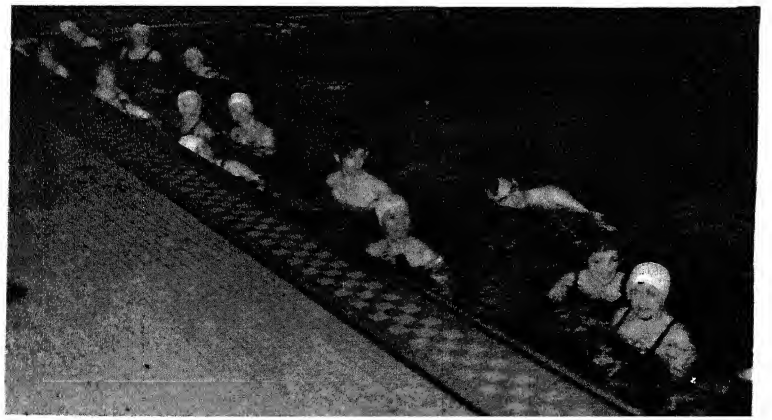
Off with the Belts! Actually Swimming

Although by this time these pupils are ready to swim without any artificial support, there should be no haste in the procedure leading to that end. The preliminary steps should be taken slowly, so that the actual swimming is fully prepared for.

17. The inflated rubber rings are discarded, and the pupils enter the water for the first time without any artificial support.

18. As the pupils stand in the shallow water, there should first be practice in breathing. They should be directed to put





the face in the water over the ears, then lift up the head and breathe. They should never be allowed to wipe the water off the face. Some will not find it easy to restrain the impulse to wipe the face with the hand. There should be considerable practice in breathing in accord with the following directions:

Inhale! (through the mouth).
Down!
Up!
Exhale! (through the mouth).
Inhale!
Down!
Up!
Exhale!
(Etc.)

19. After this breathing practice, each pupil is directed to go to the side wall near the shallow end, stand with his back to this side wall, inhale, push off lying on the water face down, float a moment, stand up on his feet, and exhale. He should not try to hold his breath too long. The important point of this exercise is to get the feeling of having the body supported by the water alone.

20. After doing the push-off as described in 19 several times, the pupil should be directed to push off again but, instead of standing up immediately, to make a stroke with each arm before stopping to stand. They should be easy strokes and not too fast. The number of strokes can then be increased to three or four, with the pupil holding his breath until he stops and stands on the bottom.

21. The next and last step in this procedure is to have the pupil push off from the side wall as before but now raise the face out of the water at the time the hand is pressing down, keep it out of the water, and breathe before stopping to stand. When the pupil can thus push off, stroke with his hands, and *breathe* before putting his feet to the bottom, he can *swim*, even if he takes only one breath. He needs then simply more practice in

the same way until he can continue for four, five, or any number of breaths. Progress from this point on is in the mastery of the crawl stroke as it is described in Chapter 2. In that progress the teacher should always direct attention to but *one* thing at a time.

6

Teaching Very Young Children

OVER AND OVER again we hear it said that a baby, placed in the water with all artificial support removed, will swim. This assertion is sometimes supported by the argument that *all* animals can swim and the human animal is no exception. As a result of reasoning in this way it is often maintained that a child of any age can be made to swim by simply throwing him into deep water, and sometimes one hears reports that this procedure has actually been carried out successfully. Typical of the assertions concerning babies is the following quoted from an article entitled "The Scent of Fear":

It is an interesting scientific fact that a baby, until 24 hours old, can swim. Beyond that age it starts to realize fear, and will sink.[1]

[1] The article, "The Scent of Fear" by Jack Melville appeared first in *Esquire* for December 1937. It was condensed and appeared in the *Reader's Digest* for January 1938. This particular quotation appeared on page 30, column 2, of the *Reader's Digest* condensed article. On February 6, 1938, I (C. C. Fries) wrote to Mr. Melville asking him to tell me upon what evidence his statement was made or to put me in touch with anyone who had carried out any such demonstration, but I have had no answer to my letter.

We have made a diligent search of all the records we could find of the teaching of very young children and, for more than seven years, have tried by experiment to establish the earliest age at which an infant can swim. So far as we know, there is not the slightest evidence to support the conclusion that either an infant or a small child can or will swim when placed in deep water for the first time. No sound argument can be based on the fact that all animals other than man can swim naturally without preparation and instruction, for these animals also do a great many other things without the long period of preparation and trial that the human animal requires, as walking, for example, or the balancing necessary to sit or stand upright. We believe, therefore, that the suggestion of throwing into deep water any child or a human being of any age who cannot swim should be roundly condemned from every point of view, and we regard any such practice as thoroughly barbaric and harmful.

On the other hand there are reports of the early swimming of infants in the South Sea Islands, like the following from Herman Melville's *Typee* (1846), which merit careful consideration.

One day, in company with Kory-Kory, I had repaired to the stream for the purpose of bathing, when I observed a woman sitting upon a rock in the midst of the current, and watching with the liveliest interest the gambols of something which at first I took to be an uncommonly large species of frog that was sporting in the water near her. Attracted by the novelty of the sight, I waded towards the spot where she sat, and could hardly credit the evidence of my senses when I beheld a little infant, the period of whose birth could not have extended back many days, paddling about as if it had just risen to the surface after being hatched into existence at the bottom. Occasionally the delighted parent reached out her hands towards it, when the little thing, uttering a faint cry, and striking out with its tiny limbs, would sidle for the rock, and the next moment be clasped to its mother's bosom. This was repeated again and again, the baby re-

maining in the stream about a minute at a time. Once or twice it made wry faces at swallowing a mouthful of water, and choked and spluttered as if on the point of strangling. At such times, however, the mother snatched it up, and by a process scarcely to be mentioned obliged it to eject the fluid. For several weeks afterward *I observed this woman bringing her child down to the stream regularly every day* in the cool of the morning and evening, and treating it to a bath. No wonder that the South Sea Islanders are so amphibious a race, when they are thus launched into the water as soon as they can see the light. I am convinced that it is as natural for a human being to swim as it is for a duck. And yet in civilized communities how many able-bodied individuals die, like so many drowning kittens, from the occurrence of the most trivial accidents!

We are inclined to believe that Melville's guess concerning the age of the infant he saw is not to be taken too literally, for the activities of the child other than those of swimming would seem to indicate an age of *months* rather than of *days*. Probably the most important statement in this account is contained in the words we have italicized: "I observed this woman bringing her child down to the stream *regularly every day*"; for if a very young child is given carefully planned and patiently directed "water experience" regularly every day there is no reason why he cannot swim by the time he can walk. The balancing in the water and the coördinations necessary for swimming seem to be even less complex for the child than the balancing and the co-ordinations necessary for walking. Formerly we believed that the acquiring of the breath control needed to deal with the water unavoidably splashed in the face of a swimmer would present a serious obstacle in the way of having very young children swim. Our experience has shown, however, that this breath control, if approached carefully, is really no problem at all to the infant. With surprising quickness does the child develop a reflex of automatically stopping his breathing when water comes into his face. The development of this reflex seems to be similar to that of involuntarily shutting the eyes when an object moves close

to them. Our youngest swimmer, Peter, had, at the age of five and one-half months, developed so completely this reflex breath control that he could be entirely submerged (his head at least six inches beneath the surface of the water) and allowed to float up, without ever breathing in any water that would make him cough. It is perhaps needless to point out here that young children do not need to be told or taught to breathe entirely through the mouth [2] while swimming; they quite naturally do so at once.

Given proper water experience, then, and given enough of it regularly, a child can learn to swim as early as he can learn to walk. Robert, our first experimental case, given regular water experience beginning at sixteen months of age, swam at eighteen months—that is, he could maintain himself afloat for more than sixty seconds without artificial support. At age four, Robert on three occasions swam a half-mile (36 lengths) in a pool, and on one occasion a little more than three-quarters of a mile (54 lengths).

Peter, our second experimental case, was given regular water experience in a tank 5 feet long, 30 inches wide, and 26 inches deep, beginning when he was seven weeks old. The following dated statements are taken directly from the record kept of this child and are selected to show something of the progress made in "swimming" as well as some facts of the correlation of that progress with other phases of the child's development.

Extracts from the Record of Peter

June 18, 1937. . . Born, Ann Arbor, Michigan. Weight 8 lb. 3 oz.
July 28, 1937. . . . . Definitely smiles.
July 30, 1937 . . . . Following moving person, with his eyes (⅞ circle).

[2] Dr. William Brady, in one of his syndicated health articles which appeared in the *Ann Arbor News* of July 10, 1938, touches this point of mouth breathing as the natural method for swimmers in the following sentences: "Swimmers should breathe entirely through the mouth while swimming anyway. Nose breathing is all right for quiet breathing, but mouth breathing is natural and best when under exertion."

Aug. 8, 1937.. *First attempt to give water experience in big tank (5 feet long, 2½ feet wide, 2⅙ feet high). Water temperature 95°F. Moved him from side to side, and laid him on his back, but no noticeable reaction. Duration of experience, ten minutes.* Weight now 10 lb. 13 oz.

Aug. 8, 1937... Makes sounds by deliberate effort. Laryngeals—glottal stops and uvular trills.

Aug. 14, 1937 .. *Foot-motion in water. Water temperature now 90°F. Water experience daily, 10 minutes, 7:30 P.M.*

Aug. 18, 1937... Follows objects easily by turning head. Smiles broadly, "crows." Vocalizes, mostly [æ]. *Jumps and kicks vigorously in tank. No signs of water-balance or any other effort to balance.* Sleeps soundly from 10 P.M. bottle until 8 A.M., when he is wakened for feeding.

Sept. 13, 1937. .. Vocalizes as he lies alone and watches his hands. Weight 13 lb. 12 oz.

Sept. 23, 1937... *Splashes with hands. Water at times covers mouth and nose. Seems to have somewhat instinctively a reflex breath control, for he automatically stops breathing when water covers mouth. Has always, in the exercise in water, breathed naturally through the mouth.*

Oct. 1, 1937..... Is able to grasp bottle and hold it for himself with some but very little difficulty.

Oct. 5, 1937..... Tries to grasp objects like colored beads.

Oct. 10, 1937.... *Very definitely breath control in water. Automatically stops breathing when waves cover mouth and nose. Has not taken in water so that he had to cough.* Balance reaction beginning. When held in sitting position on the bed and then released he seems to feel loss of balance and to try to regain it by a sudden and vigorous push which throws him completely over.

Oct. 15, 1937... *Kicks himself the length of the tank, supported by kapok jacket.*

Dec. 15, 1937.... *Breath control so complete that we tried completely submerging his head. Played "peek-a-boo." He seemed to enjoy it and submerging was repeated four times. Breath control good; no water taken in. Maximum time under water three seconds.*

Jan. 4, 1938 ..... Sits alone when put into a sitting position. Today first pushed himself up into sitting position; position not held long.

Jan. 20, 1938	Pushes himself up into sitting position and sits alone satisfactorily. *"Peek-a-boo" with submerging; allowed to float to surface before re-supported.*
Feb. 6, 1938	*Balance in water. Floats on back alone without support for from five to ten seconds when his attention is so taken with a person in proper position that he will relax completely.*
Feb. 20, 1938	*"Swims" four to six strokes without support when placed at far end of tank and then completely released after he has started kicking and using his arms vigorously. He cannot take more strokes because by the time he has taken these he is on top of me at the other end of the tank.* (No larger place available with water sufficiently warm to have him relax properly.)
March 25, 1938	Pulls himself up into standing position in pen and in crib.
April 7, 1938	Walks about pen holding on to the side. *Just noticed that his kick in the water has changed from the double kick which he has used all along to an alternate one. This change in the water seems to be connected with the leg motion of walking which he is now developing rapidly.*

In this record the following matters seem to be significant:

1. The order in which adjustments are made by a child to the water situation seems to be determined by the general physical development of the child at the time the water experience is begun. With Robert (beginning at sixteen months) the first thing mastered in his progress toward swimming was water balance. The next was breath control; then foot movements for propulsion, and later, arm movements. We had expected something like this order for Peter (beginning at two months) but there was no sign of any balance reaction in the water until well after he had shown balancing reactions on the bed. On the other hand, for him, breath control seemed to come first and preceded the matter of balancing in the water by a considerable period. Probably one should conclude from these facts that the precise method of teaching a child of any age to swim should

be determined by the details of that child's general physical development.

2. If it is true as suggested in the record under date of April 7, 1938, that the *change* to an alternating kick was due to the developing coördinations of walking, then we should probably conclude that for any child who has already learned to walk the alternating kick of the crawl stroke is easier to learn than the double kick or duplicate leg movements of the breast stroke.

3. We believe that the earliest age at which a child can *swim,* even in a rudimentary way, is about eight or nine months or near the time that he is ready to walk. And any "swimming" at this age can only be accomplished *after* the child has had a long period of carefully directed and regular water experience —at least six months.

4. To give an infant carefully directed, regular experience in water that is deeper than the child is tall seems to us to be well worth while from the point of view of his physical development, even if no skill in swimming is acquired. The light resistance of the water to push against, and the fact that *all* muscles can be brought into activity much more completely when the body is supported by the water than when it is supported by a solid surface such as a bed—these facts seem to us to make this water experience almost the perfect means for the muscular development of the infant and young child. It is, of course, impossible to *prove* a causal connection between the water exercise given to Peter and the fact that from the time it was begun he slept soundly from ten in the evening until eight in the morning for six months without once waking during the night, but certainly it seems reasonable to believe that this type of physical exercise, relaxed and always enjoyed without excitement, was a contributing factor to the thorough bodily comfort and health that showed itself in sound sleep throughout the night.

In speaking of the *teaching* of infants and very young children to swim, the word *teaching* has a significance other than that given it in traditional use, for, of course, the primary result for the pupil is not knowledge in the sense that the pupil will intellectually grasp the relation of certain movements to the act of swimming. *Teaching* here means simply giving the child experience in the water, overseeing that experience in order to prevent unpleasant or painful occurrences, guiding that experience so that certain types of reactions are stimulated, and seeing to it that desirable movements are followed by feelings of pleasure. Like *teaching* a child to walk, nothing can be gained by trying to "direct" the child's movements or by showing the child what to do; he can only be given many opportunities to practice with such supports as will keep him from injury and by the use of which he can really move from place to place.

There are, however, certain principles of this "teaching" of infants and young children which it seems worth while to set down here.

1. The child must *never* be frightened in any way. The whole experience should be thoroughly pleasurable. The head should, therefore, be carefully supported at first so that water does not come in the face.

2. Not only should the teacher be in the water with the child but *his face should be on a level with that of the child.* This seems to us to be a matter of fundamental importance in order to develop the maximum of confidence in the child and to make possible all the types of play that should help to make the water experience pleasurable.

3. The water should be warm. There should be no shock as the child enters the water. In the winter the water should be at a temperature of 88° or 90° F.; although in the summer the temperature can be somewhat lower, it should probably not be lower than 80° F. until after the child can swim with some freedom.

4. The teacher must expect very slow progress and not attempt to hurry the development of the child. The record of Peter, for example, shows a period of two months and a half between the first recognition of a breath control and the first complete submerging of the face—that is, some *seventy-five days* given to the development of this breath control before the child was thought to be ready for such a severe test as the "peek-a-boo" game. There is always great danger in too great haste. Often spectators who see a young child perform well in the water have no conception of the long period of water experience that must have preceded that performance, and press other children to attempt these same things without the necessary period of growth in water experience.

5. Although the teacher must always be sensitive to the direction in which the child is himself making his adjustments to the water situation, he should attempt to develop only one thing at a time, as, for example, breath control, or water balance, or coordinations of hands and feet. Confusion results from attempting to do too many things at once.

6. For very small children the natural stroke seems to be the so-called dog paddle. The hands press down alternately in front, and their chief function seems to be thus to keep the head above water rather than propulsion. The power to move comes from the natural alternate kick, with the pressure up. Very young children do both these movements quite naturally without special instruction. *No* attention should be given to any details of stroke until *after* the child can swim with considerable freedom.

7. We have found that the transition from moving about in the water supported by an inflated rubber ring to actually swimming without support can best be accomplished for the child by the use of some type of air-inflated support in which the air container does not completely surround the body but is solely on the back, and in which it is possible gradually to reduce

the amount of air in the support without the notice of the child. This reduction of air should proceed very slowly but very steadily until there is a period in which the child is swimming with the belt but with no air in it at all. The actual getting rid of the belt itself, even if it has no air in it, is a considerable mental hurdle for the young child and should be approached with sensitiveness and tact.

In spite of the fact that at present a young child of three to seven years of age who swims well is often without companions of his own age with whom he can play in the water on equal terms, and is sometimes thrown with older people for his continuing water experience, still the values of learning to swim at a very early age seem to outweigh all disadvantages.

First, the physical development provided by swimming is perhaps the best a child can have. The relaxed muscles necessary for satisfactory swimming prevent an overtaxing of the strength of the child, and yet the vigorous movement that swimming provides furnishes an outlet for his animal energy that makes swimming an all-round body developer.

Second, a child who learns to swim early never develops that fear of the water that those who learn to swim later in life practically never escape. One who cannot remember the time when he could not swim grows up with a love for the water that only a long period of pleasurable experiences can produce. He is forever free from the panic that is the plague of so many swimmers in deep water.

And third, a young child who can swim is provided with a source of healthful pleasure and enjoyment that is worth a great deal today, when so many of the amusements for youth are mechanical, and consist in the child being passively entertained with the least effort on his part. Here at least he is a participator finding pleasure in an exercise that contributes to his physical well-being, as well as a personal satisfaction in the de-

veloping of a valuable skill. In most sports, children, especially very young children, cannot take part on anything like equal terms with those who are older. They are, at best, only patiently tolerated. In swimming, however, the child can participate on a more equal basis, and it is therefore probably the best *family* sport.

On the whole, we should urge that children, as part of their preparation for living, be taught to swim as young as possible. In fact, we should really like to set up the slogan "Every child a swimmer by the time he enters school."

7

Diving

IN CHAPTER 5, the so-called push-off dive was described as a useful means of teaching beginners to swim. But, although diving is related to swimming, it is really a separate art in itself and deserves to be cultivated for its own sake. In this chapter are set forth some principles and methods to guide the early development of the diver, especially the first stages in that process. The necessary statements will be arranged under three headings:

1. Learning to dive.
2. Using the springboard.
3. The various classes of dives.

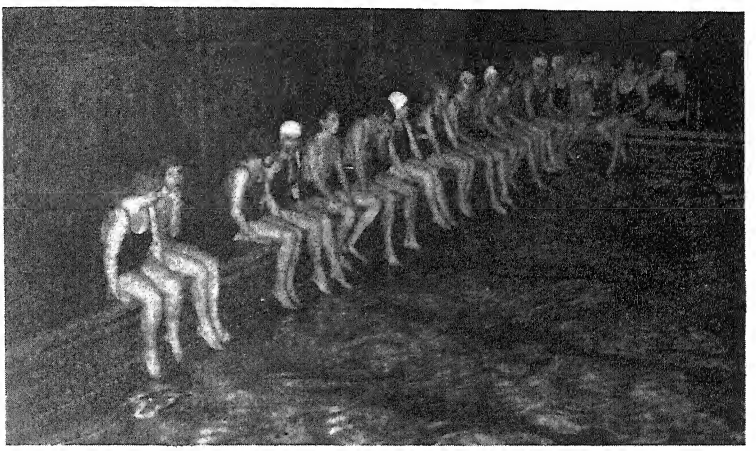
Diving is fundamentally the art of entering the water efficiently and gracefully. This art concerned itself at first with the problem of the most effective and satisfactory movements necessary for the swimmer standing on the bank to become the actual swimmer in the water. Efficiency, ease, and comfort dictated the fundamental movements.

From that point on, however, interest in the possibilities of intricate yet graceful body movements during the interval between the jump from a solid surface to the moment of entering the water has stimulated the development of the whole art of "fancy" diving. It is not the purpose of this chapter to discuss in detail this well-developed art of diving. That matter must be

postponed to a subsequent book, *Competitive Swimming and Diving*, in which there will be opportunity to deal adequately with the technique of this art. We must here confine ourselves primarily to the earlier objective of diving and simply point to the types of body movement that have been developed for the second.

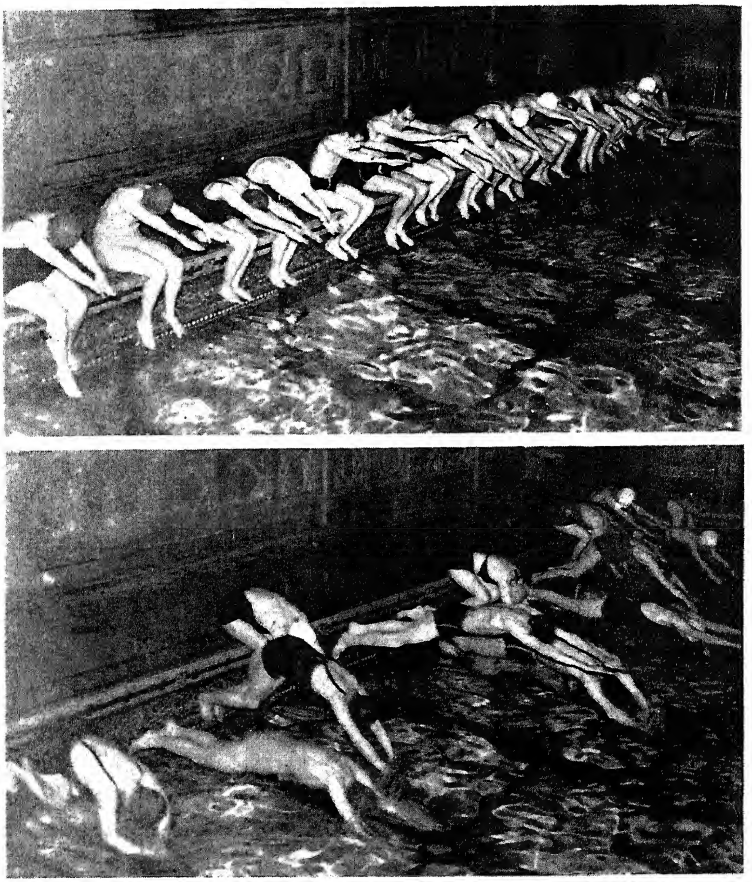
Learning to Dive

1. The "sitting-down" or "rolling-in" dive is the first step for the beginner who is to learn to dive. The position from which he starts is sitting on the side of the pool with his feet on the scum trough. As he sits there, two points should be made

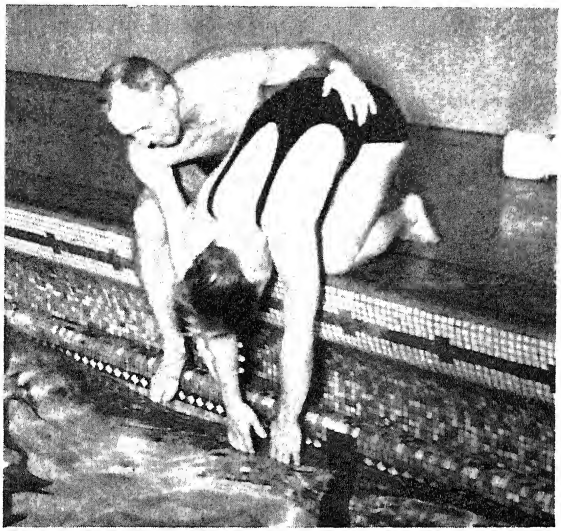


very clear and impressed upon him by the instructor. (a) He is to hold his breath until *after* he comes to the surface. Then he must not be in any hurry to exhale, but should exhale easily and somewhat slowly. This thinking about holding his breath and not exhaling too soon or too vigorously will also help to take his attention away from the actual plunge into the water. (b) He is to aim at the bottom of the pool, not at the surface of the water. The beginner without this specially emphasized instruction will naturally aim at the surface of the water which

he sees and as a result land flat. He must consciously try to dive *under* the surface, not *onto* the water.

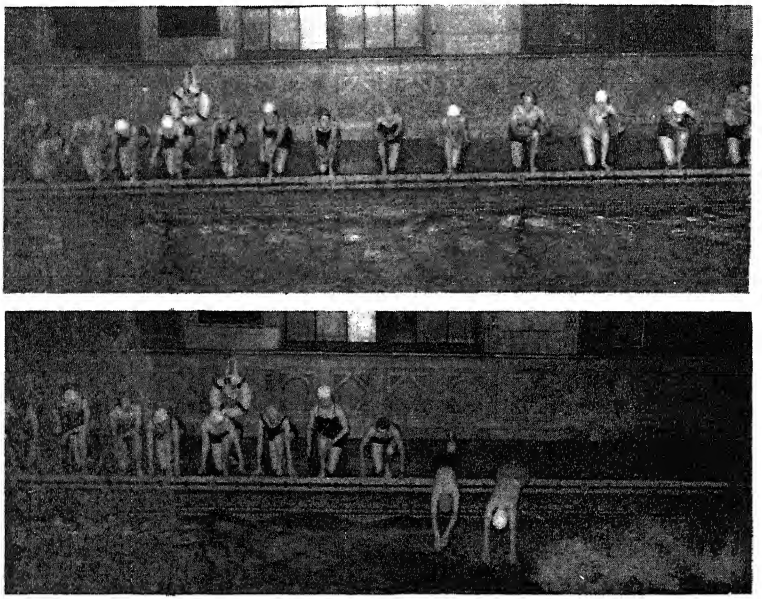


2. When his chin is tucked in to touch his chest and his arms extended forward with his head between them, he is told just to roll in, or to try to "stand on his head." He should practice this sitting-down dive until he really dives *under the surface of the water.*



3. The "knee" dive is the second step for the beginner in diving. The position from which he starts is on one knee at the

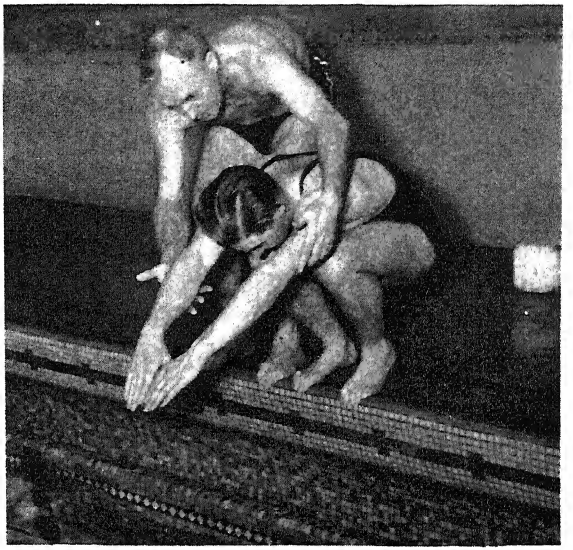
edge of the pool. The toes of the other foot should grasp the edge firmly so as not to slip. Then the pupil is told to pull in his chin and "look down his suit." He must not raise his face to look at the water but *look down his suit* all the time. Then he must lean over and, just as he loses his balance, he must push with the foot that grips the edge of the pool. His tendency will be to look up as he pushes, but this impulse must be resisted, and he must look down his suit until *after* he enters the water. He

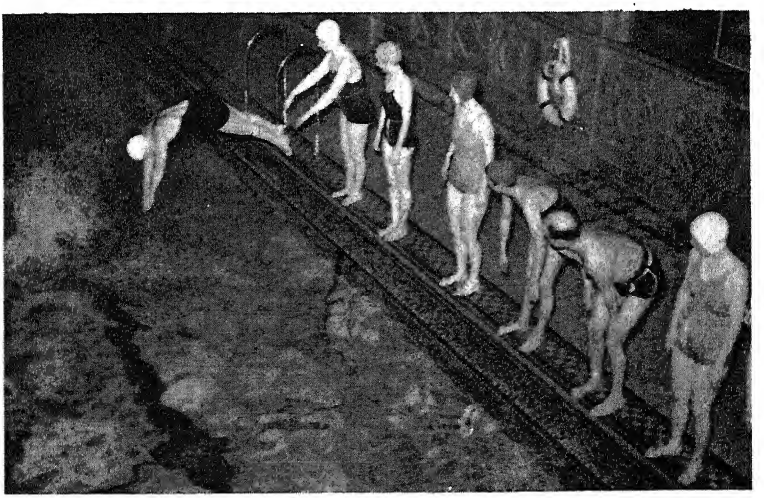


can be helped if the instructor shouts, "Look down your suit!" just as he starts to lose his balance. The push will produce a somewhat flatter dive but it still must be "under the surface." The diver should aim to go about three feet below the surface. It is still necessary to keep repeating the warning about not exhaling too soon, but the most important point to be developed with this dive is the *push*. The knee dive should be practiced

until this push at the moment of losing the balance is vigorous enough to send the diver well out into the pool.

4. The "standing up" dive is the third step for the beginner. For his starting position he stands at the side of the pool and





grips the edge with the toes of both feet so that there will be no slipping. He then bends the knees and leans forward until he is in a fairly low or half-crouch position. His chin is tucked in against his chest, his arms are extended, and he must again look down his suit as he leans forward. At the moment of losing his balance he pushes hard with his feet, his legs going *back* and *high*. Here again the instructor must repeat the directions about keeping the head in and not looking up at the water, in order to avoid a "flat" dive on the surface of the water and "belly slap"; but the chief point of emphasis should be the vigorous push with both legs.

5. After a satisfactory push in the "standing-up" dive has been developed there are three points to which attention should be given.

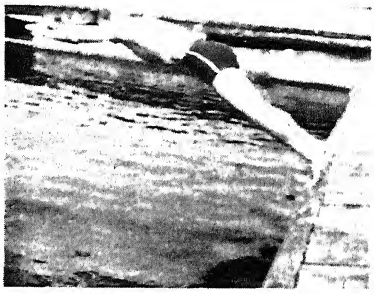
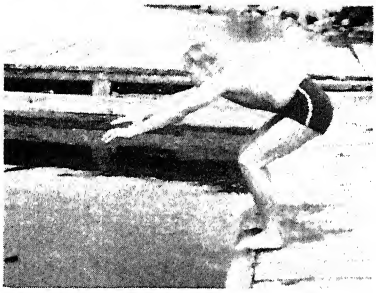
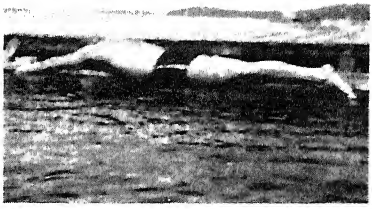
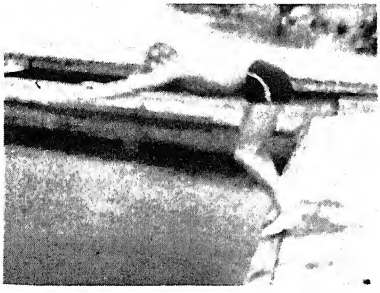
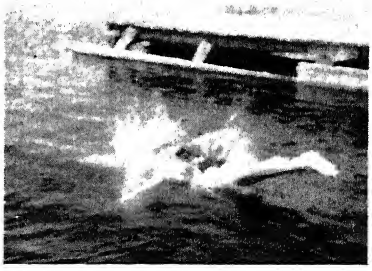
(a) The legs should be stretched (not stiffened) immediately after the push, and this stretch should not be released as the head enters the water but should be held until after the diver reaches the bottom of his dive and begins to float up. Very frequently the diver has the feeling that his whole body is in the water the instant his head goes under, and he then releases his stretch so that the knees bend and block the dive. He must hold the stretch until he begins to come up.

(b) The toes should be "pointed." This can be done if the diver tries to "curl the toes underneath the feet" as he stretches his legs. If the stretch is released and the knees bend as the diver enters the water, the feet will flatten out.

(c) There should be no hurry in coming up from the bottom of the dive. The diver should float up naturally and then exhale easily.

Tuck in your chin!
Look down your suit!
Push! Push hard!
Dive under the water, not on it.

Stretch! Stretch!
Hold your stretch until you get to the bottom.
Point your toes! Don't be a flatfoot diver.

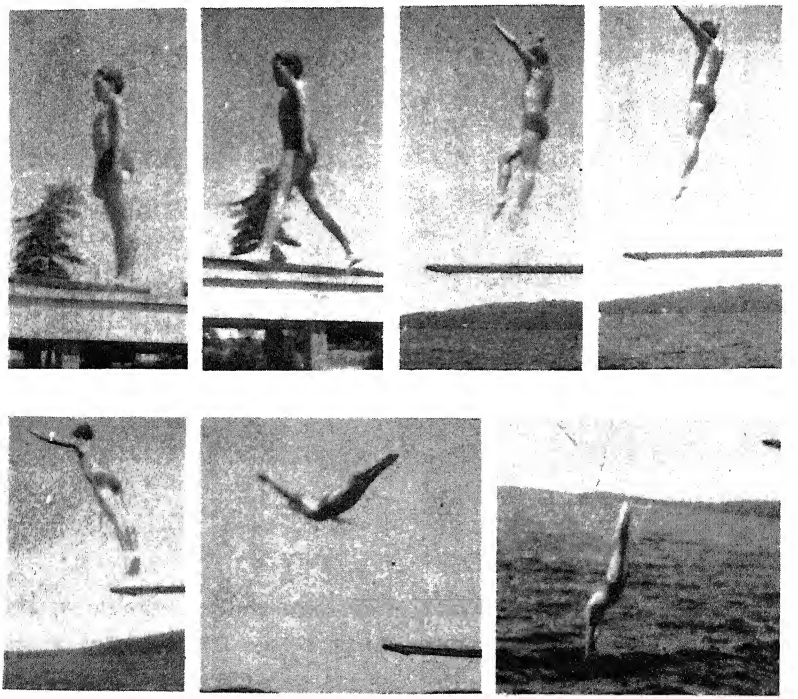







Using the Springboard

The fundamental objective of diving—that of efficiently and gracefully entering the water from the bank of a stream or the

edge of a pool—can be attained when one can satisfactorily execute the standing front dive just described. In that dive the jump and the push have been shown to be most important. The first step in developing more intricate body movements between the jump and the entry into the water was to find some means of increasing the power of that jump in order that there might be more time for these body movements. Two devices have been used: the tower to start the body higher above the water, and the springboard to throw the body higher than a person could naturally jump. The springboard is more commonly provided and more generally used.

6. The approach, that is, the movement from the back of the board to the front part from which the spring is made, requires at least three steps. These steps should be taken naturally with



relaxation of the body (not with any straining to place the feet at particular places). The diver should stand erect, with his chest well up, and look straight ahead, *not down at the board.* The arms should swing loose and in general there should be considerable relaxation.

7. At the end of the three steps there is the "hop" or "hurdle" —the jump which brings both feet together down on the tip of the board. The hop should be *high,* from eighteen inches to two feet. It is done by bringing up one knee in the jump by which the diver lands lightly on the very end of the board.

8. It is very important to land *as lightly as possible* on the end of the board and then let the board take the weight of the body. Too often, divers, in their effort to get "height" for their dives, "pound" the board—hit it as hard as they can at the end of the hurdle or hop—in the mistaken belief that this force will make the board give them a greater spring. Instead of getting help from the board, they lose control. Lightness of touch on the end of the board is essential to a good dive.

9. One should land on the end of the board standing perfectly straight—not stiff, but straight and supple. Many divers, in the process of learning, make the mistake of "anticipating the dive" and begin to lean forward in the hurdle or as they land on the end of the board. This "leaning over their dive" prevents them from getting proper height for the body movements in the air and interferes with the proper timing of these movements.

10. As the board gets down to the bottom of its bend with the weight of the body, the diver presses with the balls of his feet, swings the arms up, and "lifts," that is he pulls up on his chest, stretches his legs, and thus sails up and out. He must go *out* on the lift, not simply up. Pulling up on the chest muscles will produce sufficient arc. And then the hands are brought together, the chin is pulled in, the legs go completely up slowly, and the diver drops straight down into the water.

Altogether the efficient use of the springboard in the approach, the hurdle, and the lift, is basic to the art of diving.

Relax on the board as you start.
Get that knee up, and a high hop.
Just tickle the board; don't jump hard.
After the hurdle, lift! Get height.
Stretch! Don't stiffen.
Take the dive down to the bottom of the pool.

The Three Classes of Dives

The thirty or more dives recorded in the rule books as the ones from which divers in competition may choose the particular ones to perform can be grouped into three classes. The differences, of course, in these dives are primarily the differences in the body movements in the air after the diver leaves the board and before he enters the water. These are the movements that constitute the art of "fancy" diving.

There are, first, what can be called the "floating" dives, as, for example, the front dive ("swan" dive), the back dive, the half gainer. In these, the arms must be outstretched from the shoulders—straight out—the chest drawn up, the stomach pulled in, and the toes extended behind. In the back dive and in the half gainer, as soon as the diver lifts from the board, he *drops* his head back (it is not *held* back but *dropped* back), draws up his chest, and starts pulling backwards with the chest muscles while he pushes down from the waist, always pulling a little harder than he is pushing. He must not let the feet come up too soon. When he gets back half-way on the pull, the hands are thrown over the head to assist the pull so that the body completes the dive. The legs are always well back until just the moment of entry to the water. The beauty of the well-executed floating dives is always a delight to the spectator.

There are, next, the jackknife dives. The "jackknife"—the bending of the body at the hips so that the hands practically touch the toes—is done at the height of the lift from the board. As the diver leaves the board, while keeping his head up and shoulders back, he lifts his hips up and back.

The hips must be raised high but the head, which balances the dive, must not be dropped. The legs should not be clasped by the hands, for this interferes with proper relaxation; the arms simply drop forward as the legs hang down. The pull is done with the hips, up and back. After this bend or jackknife is done at the height of the dive, the legs are thrown back on the hips, the body straightens out, the legs are stretched, and the diver drops to the bottom of the pool. All jackknife dives are done with a fully relaxed action, particularly at the waist.

There are, finally, the *spinner* dives. These are somersault dives: the front one-and-a-half, double, or two-and-a-half; the back one-and-a-half, and the "Dutchman" one-and-a-half. They are done either with the body in a crouch with the knees bent or with the jackknife formation. The first is called the "tuck" formation; the second the "pike." A "layout" is done, as is implied in the name, with the body straight out; there is no bend either at the hips or at the knees.

Spinner dives are of two sorts, the "tuck-up" dives and the "tuck-down" dives. In the back one-and-a-half and in the Dutchman one-and-a-half, for example, the knees are brought up and the head and shoulders thrown back. They are thus tuck-up dives. In the front one-and-a-half, the double, the two-and-a-half, and the back spring forward one-and-a-half, however, the spin is started with the drive of the head and shoulders downward to meet the knees. They are the tuck-down dives. The timing of the two kinds of dives differs somewhat, for the diver should hold the tuck somewhat longer on the tuck-up dives than on the tuck-down dives. In any case, the body movements in the air should never be started too soon, in order

to get all the height possible out of the lift from the springboard. Anticipation of the dive, hurrying, spoils the execution of more dives than any other single cause.

These three classes of dives, with their intricate body movements requiring a skill that can be developed only by long months and years of patient practice, have become the most spectacular feature of swimming exhibitions. Fancy diving, however, is a highly specialized art, and only in its primary objective does it relate to the fundamental processes of swimming, which are the particular province of this book. But here too the general slogans of all swimming have their application:

Relax! Always relax!
Stretch, don't stiffen.
Take your time!
Relax!

8

Water Safety

IN CHRISTOPHER MIDDLETON'S *A Short Introduction for to Learne to Swimme*, published in London in 1595, there occurs this sentence:

> But for some will object, that if swimming were so naturall a thing to a man, then should not so many perish in the water, to these in a word I thus answere; that men who have not had some practise in it afore, when by any sinister occasion they fall into the water, the discreet use of their sences is taken away by a suddaine feare, and so unorderly labouring in the water, they by the indirect mooving of their bodyes pull downe themselves under the water, and so are drowned, which to avoyde I leave it to every severall mans consideration how necessarie a thing this Art of Swimming is.

Here, in the first book in English on swimming, is suggested the very best method to make deep water safe for human beings —that is, to teach every human being to swim. In line with the modern point of view of preventive medicine, Middleton would strive to make everyone *immune* to drowning. And certainly in the face of the thousands that are drowned in our lakes and rivers each year, there is ground for arguing that the schools should insist on having every pupil learn to swim just as they insist upon having every pupil vaccinated against smallpox.

But, it is objected, even those who can swim sometimes drown. This is perfectly true, and we cannot ignore the potential dan-

gers of deep water for thoughtless people. In fact, that is the very reason for including in this book a chapter on water safety. We cannot attempt to set forth here the complete technique of life-saving. All that we can do is to stress some of the elementary matters that everyone who goes near deep water should know.

First there are many superstitions and traditions concerning drowning people and deep water that have no basis in actual fact: [1]

1. It is a common belief that a drowning person goes down three times, or, to put it another way, that after first going under he will rise again to the surface twice before finally sinking. As a matter of fact, many of those who drown go under the surface and no portion of their bodies shows above the surface even once. In other cases, depending on the chance movements of the arms and legs, the body may appear at the surface five or six times.

2. There is the common belief that a swimmer taken with

[1] As a matter of fact, the swimming books of the past three hundred years contain many absurd statements that prove that some of them must have been written by those who could not themselves swim or by those who had very little actual experience in the water. Often the same absurd statements appear in identical form in several books. The following sentences quoted from *The Swimmer's Companion* (1852) are typical (page 4): ". . . then plunge under it (the water) with your eyes open, which must be kept open before going under, as you cannot open the eyelids when you are beneath the surface for the weight of the water above you." And again (page 11): "In diving, the eyes should be kept open, you must therefore take care that you do not close them as you reach the surface, because, as before stated, it is extremely difficult to open them when under the water."

In R. Harrington's *A Few Words on Swimming* (1861) appear these sentences (page 13): "As regards the management of the breath, it is the general practice to blow through the nose before taking in a breath, more especially after having been under the water. The reason is this. Being under water the nostrils are filled; if the mouth is opened, *the water rushes through the nose into the mouth,* which is prevented by first blowing through the nostrils."

"cramps" sinks immediately and can in no way help himself. It is thought that such cramps are caused especially by entering the water too soon after a meal. It is probably wise not to swim or take any violent exercise immediately after eating, but we have never known a case of cramps that caused a swimmer to sink immediately or that rendered him completely helpless. Knotted leg muscles do occur when one has not been swimming with proper relaxation, but they never in themselves cause a swimmer to sink. We believe that most of the so-called cramps that endanger the lives of swimmers are really the muscles made rigid by fear and panic. Part of the cure for such states of fear and panic is to kill the bugaboos with which superstition and tradition have surrounded man's experience with deep water.

Another item should probably be added here, although it merely touches our immediate problem only partly.

3. It is commonly believed that "sink holes" and quicksand *suck* down unlucky persons who happen to be caught in them. As a matter of fact, these places of loose earth with no solid bottom present essentially the same conditions as deep water except for the fact that the sand or mud is "thicker" and a bit harder to deal with. The person sinks down rapidly who tries to stand upright. He can make progress and extricate himself if he assumes a swimming position and adopts swimming technique as far as this medium will permit.[2] The breast-stroke methods are best adapted for use in sink holes, muck, or quicksand.

Really the greatest danger to the person in deep water is *panic*. When the inexperienced swimmer feels himself out of breath he often begins to worry about it. If he is some distance from shore or any sort of support, there comes into his mind what he has heard of "exhausted" swimmers and he worries

[2] This point is based especially on the experience of Professor Carl Hubbs of the University of Michigan.

more. Worrying serves to tense his muscles, especially his breathing muscles, and he "fights for breath." The tenser his muscles, the harder he must work, and the harder he works, the more out of breath he becomes, until he is in a thorough panic. As has been pointed out before (Chapter 1), swimmers drown not because of *exhaustion* as is so frequently said, but because of panic. Panic is the monster that must be killed, and we can do much if it can really be recognized for the danger it is and talked about and prepared for.

The particular situation that causes panic in swimmers more easily than any other is to be caught or held under water. It seems to be a natural reaction to struggle and fight to get to the surface when anything interferes and prevents it even for a moment. It seems to demand a good deal of practice (even for those who swim with freedom) for one to get into the habit of relaxing under water. And yet relaxing under water makes it possible to hold the breath for a much longer time. Struggling uses up very rapidly the oxygen that one has. Practice under water, a little rough water polo, for example, is exceedingly valuable in preparing a swimmer against panic in emergencies.

And this brief consideration of the matter of panic leads us to the question of who should attempt a rescue when a person is in trouble in deep water and likely to drown. Certainly the swimmer untrained in life saving should never attempt a *swimming* rescue. He should use a boat if one is available, or throw a rope, or push a floating support of some kind within reach of the one in trouble, or he should get help. But he should never attempt to swim to the struggler and carry him to safety unless he has had training in that particular type of thing. Life saving is serious business, and training in it should constitute a part of every swimmer's education, but it should be such thorough training that the swimmer understands all the hazards involved and is prepared for them. He is certainly not ready for life

saving until *he has had experience in panic-producing situations in the water* and has demonstrated his ability to deal with them satisfactorily.

For the methods of rescue, we would offer here a very few principles that cannot be stressed too strongly or too often.

1. A boat, a rope, a plank, or some type of floating support should be used whenever possible.

2. Anyone who allows the struggler to grip him has not learned the very first rule of a swimming rescue. The drowning person should be approached from the back, preferably under water. The taking hold should be sudden and hard. The rescuer should never get into a situation in which he needs to break a hold. But if, by accident, he should be grasped, then he should try sinking first, for if he goes down deeper in the water the struggling person will probably release his grip.

3. The only good carry for a struggling person is with the rescuer behind the back of the drowning person, and with his arm over the shoulder and across the chest, with a hold tight enough to prevent rolling out of his grip.

4. The rescuer should then support the one to be rescued until help comes. He should not try to swim in, unless shallow water is close at hand, except as a last resort when he knows that no other help is available. If there is an overturned canoe or a boat or any sort of float, he should *never* leave it in an attempt to swim the rescued person to shore without support.

5. If the rescued person can be got to lie quietly, then the rescuer can use one of the other carries—the head carry, or the knee carry—which are much easier because the person carried simply floats on the water.

After the rescued person has been brought to shore there is the problem of reviving him if he has breathed in so much water that he is unconscious. The older methods of artificial respiration by rolling the body from face down to the side and back

again, or by laying the person on his back and rhythmically raising his arms above his head and then pressing them down upon his chest, have all been displaced by what is called the Schaeffer method. The Schaeffer method is very simple and very effective:

1. The rescued person is laid flat on the ground, stomach down. His head is turned to one side. Both arms are forward, but the one on the side toward which his head is turned must not be too near his face. The mouth must be free and the tongue out.

2. The rescuer straddles the hips of the rescued person and places his hands on both sides of the small of his back.

3. The rescuer then leans forward, pressing down and forward with a moderately easy force. This pressure is completely released and then repeated every *four* seconds. It must not be hurried, but done regularly, rhythmically—about fifteen or sixteen pressures to the minute, the rate of normal breathing. This rate is exceedingly important, for in the excitement of a real rescue the tendency will be to increase the speed. It is best to count four slowly between each pressure.

Two additional statements seem worth while.

4. No matter how impossible it is to feel any pulse or hear any heart beat in the rescued person, this artificial respiration should be continued at least an hour before the effort is given up as hopeless. There are a number of cases on record of reviving, by means of artificial respiration, persons who have been under water from twenty to thirty minutes. In some instances it has taken two hours of work. Therefore, *don't give up too soon.*

5. It is perhaps unnecessary to add here that this method of artificial respiration is effective also in the cases of those persons who have suffered such an electric shock as to make them unconscious.

We should like again to insist finally that true water safety

is *preventive*. A few simple precautions (such as not to swim alone) will eliminate most of the natural dangers of deep water for thoughtless human beings. The *fear* that has been so often fostered is really one of the greatest dangers, for it prepares the ground for and so easily leads to panic; and the best way to eliminate fear of the water is to develop the ability to swim. The one who is teaching and fostering swimming is therefore the true life saver.

9

Competition and the Development of Swimming

AS ANY ART really becomes of interest to Man, there arises an effort to find out just what, in that art, a human being is capable of doing. World records are thus attempts to establish, in concrete and specific terms, the limits of Man's accomplishments. They indicate the boundaries of Man's actual freedom in the areas for which they appear. But wherever we recognize a boundary of restraint—whenever a limitation is set in a "Thus far thou canst go and no farther"—there we accept the challenge, and constantly struggle to push out the lines that seem to show the limits of our powers. A new record, therefore, in almost any area of human activity is acclaimed because it seems to be a sign that new territory has been won for mankind; it is a tangible proof that the older statement of the limitations of Man's abilities is too limited, and needs to be revised. It is also a demonstration of the soundness of our faith in the future progress of mankind, in the "not yet" of his achievement.

In the art of swimming, speed and distance are the measures of efficiency, and therefore the records of Man's best swimming accomplishments are expressed in terms of the fastest speeds by which certain measured distances have been swum. But before

there could be any satisfactory records of Man's best achievements in swimming it was necessary, first, to establish organized competition, and, second, to set up rules for that competition. Only by organized competition is it possible to bring out the maximum efforts of swimmers and discover what is the range of a human being's swimming ability. And only by adhering to strict rules is it possible to make the conditions of competitive tests held at different times and different places similar enough to make the results comparable. As a matter of fact, accepted world records are now really world records in the sense that, if the rules are adhered to, they can be established and broken in any part of the world. As a matter of fact, too, the remarkable development of the art of swimming in modern times has been the result of greatly increased organized competition.

The ancients appreciated the practical values of swimming especially for military uses. Alexander the Great is reported by Sir Thomas Elyot to have lamented when, in India, his army came to a river they wished to cross "O howe moste unhappy am I of all other that have nat or this tyme lerned to swymme!" Yet there seems to be no record of swimming contests in the holiday plans of the great all-Greek games. There are many records of individual swimming feats, the best-known of which is Leander's swimming the Hellespont. Among the Germanic peoples to the north, swimming contests are recorded much more frequently; the older literature abounds in tales of miraculous swimming feats. The best-known of these is perhaps the contest between Beowulf and Breca, who, as the poet tells, clad in armor, continued one race for seven nights and seven days out in a stormy sea off the coast of what we now call Scandinavia.

How much these earlier contests did for the art of swimming we do not know but it does seem clearly demonstrable that the remarkable advances in the efficiency of swimming since the 1880's grew out of the increasing opportunities for organized

competition made possible by the rapidly growing number of local swimming clubs and the uniting of these clubs into district and national swimming associations. In England there was first Stivie Jones, the "champion" of the 80's, who swam the side stroke and made a hundred yards in sixty-eight seconds. Then came the Staleybridge Swimming Club of Lancashire, England, and their Joe Nuthall, who, with the "English over-arm," swam the hundred in 66¼ seconds. But the English over-arm was beaten by the new trudgeon stroke as used by Jack Tyers of the Manchester-Osborne Swimming Club. He did the hundred yards in 59.8 seconds. Out of Australia came the two Cavill brothers with a two-beat kick crawl stroke—the Australian crawl—and they beat Jack Tyers and the trudgeon stroke. And then Charlie Daniels of the New York Athletic Club developed a much faster kick than that used in the Australian crawl and swam a hundred yards in 55⅘ seconds. Here was the "American" crawl which has become so popular. Along about 1910, from Hawaii, came Duke Kahanamoku, who brought down the record for the hundred yards to 53 seconds, largely because of the powerful leg kick which he had developed. Such competition centered attention on the *methods* of swimming. The old strokes were discarded and the new strokes adopted not because of any theoretical discussion but because the new strokes proved themselves more efficient in actual realistic competition.

Such competition, however, not only served to make the side stroke, the English over-arm, the trudgeon, and the Australian crawl obsolete and to develop new methods of swimming for the champions; it also aroused much popular interest in swimming itself—an interest which showed itself in the building of an increasing number of swimming pools and in the hiring of professional swimming coaches. The effect of these men, whose business it was to devote themselves to a practical study and analysis of swimming technique in order to develop champions, upon the development of the art of swimming must not be

underrated. Among the first of them was Bill Bachrach, who developed first the champions Harry Hebner, Perry McGillivray, and Arthur Raithall, and later Johnny Weissmuller. Johnny Weissmuller, carefully trained in the technique of the champions from an early age, brought the record for the hundred yards down to 51 seconds.

In the earlier days it was the Athletic Clubs that provided the opportunities for organized competition and supported the professional swimming coach; during the last twenty-five years, however, swimming has become in the United States more and more an important sport in university, college, and high school. Indeed, today, more than 90 per cent of the swimming champions in this country are college boys trained first by high school coaches and later by college coaches.

In the Olympic games of 1932 the swimmers from Japan won all but one of the swimming races, for the Japanese had become seriously interested in swimming in 1928 and had devotedly studied the technique of the champions, using every available mechanical device for recording and analysis, especially very slow motion pictures. They then adopted certain modifications of the American crawl which permitted greater relaxation and in 1932 demonstrated the soundness of their results by winning practically all the races.

Enough has been said in this rapid review of some of the more important steps in the development of organized competition to show the nature of the evidence from which we draw the conclusion that the art of swimming owes much to the struggle to win championships. Swimming coaches have given much thought and effort to the problems of more efficient swimming; their work has been tested in the realistic measurement of keen competition; but above all, the thousands of organized contests all over the country have aroused an interest in swimming and diffused a knowledge of the best types of swimming. Competition has not only been the means of developing the technique of

this valuable art; it has also been the means of bringing it to the common man and the school child. Today, as a result of a consciously developed technique, our champions are far superior to those natives of the South Sea Islands who live so much in the water and whose swimming prowess has been so highly praised. Today, for many a high school boy, Leander's world famous swim across the Hellespont would be no great feat.

There is much more to be learned from the technique of the champions and the practices of the coaches, and there is much that is essential to speed swimming that has never appeared in print. But these matters must be dealt with in a separate book and not here where we have tried to present only the fundamentals of swimming.